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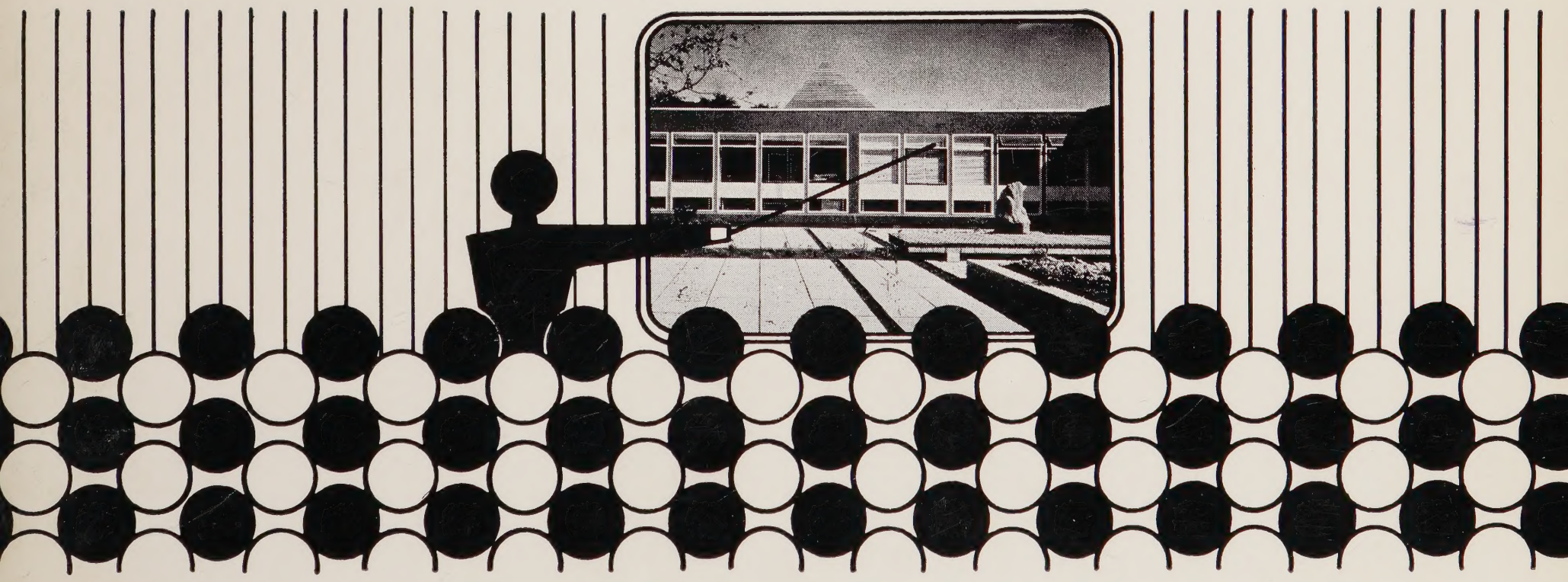

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COLLECTED CONFERENCE REPORTS 1968

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PREFACE

The full-day conference sessions at the Scottish Hospital Centre have continued to be popular occasions. During 1968 ten important subjects were reviewed in some detail and the reports are presented in this volume. At each conference the Chair was taken by a member of the Council of Management of the Centre.

With 54 authoritative speakers and audiences representative of a wide range of interests related to the particular topics, much up-to-date information and stimulating comment emerged. The objective at these conferences has not been to seek finite conclusions but rather to provoke thought and discussion. It is hoped that these aims will be extended by publishing the conference reports in this form.

February, 1969.

DR. J. K. HUNTER
Director

CHAIRMEN

Lady Baird

Dr. J. H. F. Brotherston
(on two occasions)

Mr. R. G. Clark

Mr. J. K. Johnston

Mr. E. U. E. Elliott-Binns
(on two occasions)

Dr. A. K. M. Macrae

Provost J. G. Robb

Mr. G. G. Savage

MAIN SPEAKERS

The sterilisation and distribution of surgical instruments in hospitals—January 1968

Professor D. M. Douglas, Department of Surgery, University of Dundee.
Sir James Fraser, Bt., Department of Clinical Surgery, University of Edinburgh.
Miss A. McCreath, Theatre Sister, Royal Infirmary of Edinburgh.
Mr. A. I. S. Macpherson, Consultant Surgeon, Royal Infirmary of Edinburgh.
Mr. A. G. Hutchison, Consultant Urologist, Victoria Infirmary, Glasgow.
Mr. A. J. G. Percy, Director, Messrs. Down Bros. and Mayer & Phelps Ltd.
Dr. Cameron Weymes, Group Medical Superintendent, Victoria Infirmary, Glasgow.

Ambulance services—February 1968

Mr. R. Marshall, Secretary and Treasurer, St. Andrew's Scottish Ambulance Service.
Dr. J. Killoch Anderson, Group Medical Superintendent, Glasgow Royal Infirmary.
Mr. A. R. Batchelor, Secretary, North-Eastern Regional Hospital Board.
Mr. I. Campbell, Consultant Surgeon, Belford Hospital, Fort William.
Mr. V. Whitaker, Chief Ambulance Officer, West Riding of Yorkshire.

Hospital hazards—March 1968

Dr. G. D. Forwell, Principal Medical Officer, Scottish Home and Health Department.
Miss A. I. C. Bone, Matron, Ayr County Hospital.
Dr. J. C. Gould, Director of the Central Microbiological Laboratories, Edinburgh.
Professor J. R. Greening, Head of the Medical Physics Department, Royal Infirmary of Edinburgh.
Mr. A. F. Neilson, Legal Adviser and Solicitor, Central Legal Office, Edinburgh.
Dr. J. W. Brooke Barnett, Deputy Secretary, Medical Defence Union, London.

The place of the small hospital—April 1968

Mr. J. Leithead, Chief Executive Officer, Research and Intelligence Unit, Scottish Home and Health Department.
Dr. C. J. Swanson, General Practitioner, Aberfeldy, Perthshire.
Rev. J. W. Cumming, Ex Chairman, Board of Management for Nairn Hospitals.
Dr. J. Laurie, Consultant Physician, Dumfries and Galloway Royal Infirmary.
Professor S. L. Morrison, Department of Public Health and Social Medicine, Edinburgh University.

Staff communication in hospitals—May 1968

Mr. T. E. Carruthers, Department of Psychology, University of Glasgow.
Miss B. P. Millar, Matron, Glasgow Royal Infirmary.
Mr A. Rawcliffe, Assistant Group Secretary, East Birmingham Hospital Management Committee.
Mr. I. W. Murray, Information Officer, Eastern Regional Hospital Board.
Dr. J. F. Kirk, Group Medical Superintendent, Glasgow Northern Hospitals.

Pre-discharge or "minimal care" wards—June 1968

Dr. G. H. Scoular, Area Medical Superintendent, Ayrshire.
Professor D. J. Newell, Nuffield Department of Industrial Health, Newcastle University.
Dr. A. Zinovieff, Department of Physical Medicine, Dryburn Hospital, Durham.
Miss A. Court Brown, Regional Nursing Officer, Western Regional Hospital Board.
Mr. J. Leithead, Chief Executive Officer, Research and Intelligence Unit, Scottish Home and Health Department.

The place of systems in hospital building—September 1968

Mr. B. Annable, Deputy Chief Executive, National Building Agency.
Mr. W. J. Jobson, Regional Architect, Sheffield Regional Hospital Board.
Mr. I. G. Plenderleath, Partner with Messrs. Baxter, Clark & Paul, Architects.
Mr. J. Jarvis, Senior Engineer, Scottish Development Department.
Mr. J. W. Parsons, Superintending Architect, Research and Development, Ministry of Public Building and Works.

The confused elderly—October 1968

Dr. H. B. Craigie, Principal Medical Officer, Scottish Home and Health Department.
Dr. R. A. Robinson, Consultant Psychiatrist, Crichton Royal Hospital, Dumfries.
Dr. J. H. Henderson, Consultant Psychiatrist, Bilbohall Hospital, Elgin.
Dr. J. Williamson, Consultant in Geriatric Medicine, Eastern General Hospital, Edinburgh.
Professor W. Ferguson Anderson, Cargill Chair of Geriatric Medicine, University of Glasgow.

Blood transfusion—November 1968

Dr. I. S. Macdonald, Senior Medical Officer, Scottish Home and Health Department.
Dr. R. A. Cumming, Regional Director, Edinburgh and South-East of Scotland Blood Transfusion Service, Royal Infirmary of Edinburgh.
Dr. J. Wallace, Regional Director, Glasgow & West of Scotland Blood Transfusion Service, Law Hospital, Carluke.
Dr. I. A. Cook, Regional Director, North of Scotland Blood Transfusion Service, Royal Northern Infirmary, Inverness.
Dr. J. R. Donald, Consultant Anaesthetist, Law Hospital, Carluke.
Dr. G. A. MacDonald, Consultant Haematologist, Royal Infirmary, Glasgow.

Medical record linkage—December 1968

Dr. M. A. Heasman, Co-Director, Research and Intelligence Unit, Scottish Home and Health Department.
Dr. E. D. Acheson, Director, Oxford Record Linkage Unit, Oxford Regional Hospital Board.
Dr. W. R. S. Doll, Director, Statistical Research Unit, Medical Research Council.
Dr. J. A. Baldwin, Research Fellow, Mental Health Research Unit, University of Aberdeen.
Mr. J. S. Robertson, Scottish Office Computer Services.
Dr. I. D. G. Richards, Social Paediatric Research Group, University of Glasgow.

OPENING SPEAKERS AT DISCUSSION SESSIONS

Mr. D. Miln, Consultant Surgeon, Stobhill Hospital, Glasgow.

Mr. W. Sillar, Consultant Orthopaedic Surgeon, Southern General Hospital, Glasgow.

Mr. A. L. Rennie, Assistant Secretary, Scottish Home and Health Department.

Dr. G. A. Scott, Medical Officer, Scottish Home and Health Department.

Professor J. A. Strong, University Department of Medicine, Western General Hospital, Edinburgh.

Mr. A. R. H. Bott, Senior Architect, Scottish Hospital Centre.

Dr. G. C. Timbury, Physician Superintendent, Gartnavel Hospital, Glasgow.

Professor J. D. Robertson, Department of Anaesthetics, Royal Infirmary of Edinburgh.

Professor E. A. Cheeseman, Department of Medical Statistics, Institute of Clinical Science, Belfast.

THE STERILISATION AND DISTRIBUTION OF SURGICAL INSTRUMENTS IN HOSPITALS

There have been remarkable developments in the ways in which sterile items are processed, packaged and presented for use. Of the items involved, surgical instruments present particular problems and many of these were outlined and discussed.

Lady Baird took the Chair.

Professor D. M. Douglas of the Department of Surgery, University of Dundee, introduced the subject by outlining the planning of the operating theatre area for the teaching hospital now under construction at Ninewells. The suite of 6 theatres included a research department of anaesthesia and a reception and recovery area. The whole department was planned in a series of zones. A C.S.S.D. to serve some 2,000 acute and 6,000 other beds in the Region and to provide theatre instruments in pre-packed trays for Ninewells was located below the theatre suite and will be connected with it by manned lifts. The planned flow of surgical instruments between the T.S.S.U. and sterile stores, layout room, theatre and disposal areas, was outlined. Used items would be separated into those for incineration or for recovery and re-processing: the latter would be taken via the "disposal" corridor to the soiled side of the T.S.S.U. A sterile layout room had been incorporated in each theatre complex so that preparation could be made for the next case while the theatre was being cleaned. It would also allow any "special" instruments to be added at leisure. It was considered practicable to have both a T.S.S.U. and a Regional C.S.S.D., and a compact association between these units had been achieved at Ninewells. Experienced tray layers could be concentrated in the T.S.S.U. which was in effect a specialised sub-section of the C.S.S.D. Again, the C.S.S.D. could supply ward and/or theatre instruments to users outwith the main theatre suite and act as a reserve against emergency.

It was noted that taking into account the needs of emergency admissions, the operative work for the week could be reviewed with the theatre nursing staff and a programme prepared. This would be facilitated by the adoption of a divisional system. By planning work in advance, the requirements of theatre trays could be anticipated. Little experience was available of the number of trays required by a given number of surgical beds. An analysis of emergency and elective admissions to the professorial unit of 60 beds in Dundee had shown a daily variation of 3–19 patients: the monthly totals, however, remained fairly steady at around 30 emergency and 80–100 elective admissions. On this basis, each theatre might require to hold five major sets, supplementary packs being added as necessary.

It was suggested that a C.S.S.D. of some 7,000 sq. ft. and a T.S.S.U. of about 800 sq. ft. would be required and that these areas should be under the control of a hospital infections officer who might suitably be a bacteriologist trained in epidemiology. Laboratory and research provision should be made and be under this officer's control. A competent C.S.S.D. superintendent was essential, together with the necessary technicians and assistants. In conclusion, Professor Douglas commented on the problems of items not sterilised by heat and stressed the need for further studies into alternative methods of sterilisation including the possible use of gamma irradiation.

Sir James Fraser, Bt., of the Department of Clinical Surgery, University of Edinburgh, spoke as a user of the Theatre Service Centre at the Royal Infirmary of Edinburgh and as one who had watched the concept develop from the planning stage to a complete service. The previous theatre organisation was confused; it was governed by the overall hospital design with multiple theatres, multiple surgeons, each with individual interests and requirements, and individualist theatre sisters. Each theatre was an independent unit and in the majority of cases, the preparation areas and sterilisation facilities were, as elsewhere, primitive and frequently bacteriologically hazardous. Multiple supply, service and storage requirements were uneconomic in money and man-power.

The picture had been radically changed by the development of a Service Centre. This had resulted from a recommendation that the new Infirmary should have a Central Theatre Supply Unit and from studies of local theatre infections; these studies had been extended to include the examination of all aspects of theatre activities in the Infirmary. The basic requirements had been examined individually as it was recognised that each was important; any lowering of standards in one could destroy the standards of the whole. They included—preparation, sterilisation, layout of instruments, maintenance of asepsis, disposal of soiled materials, the storage of instruments and materials, the need to meet unexpected demands and to provide an efficient service for both emergency and elective work.

The result of this initial study was the introduction of the pre-set tray on which instruments for a specific operative procedure were set out in such a way as to require a minimum of alteration by the theatre sister and of delay before use. As each tray was a complete and independent unit it could be dismantled, re-set and sterilised at will; it could be held in store but be available for immediate use.

The original trays were designed for use in the neurosurgical and thoracic units where the immediate requirements were maximum speed of access consistent with full sterility. They were packed, used and dismantled within the theatre, and they solved the problems of sterilisation, storage and of meeting sudden unexpected demands. They did not, by themselves, influence other aspects of the theatre work but it was felt they would form an acceptable basis for all theatres and if the functions of preparation and dismantling could be removed from the theatre area, they would improve the efficiency of all the elements of theatre activity. The original concept of the Theatre Service Centre was not just a means of supplying sterile instruments to theatres; it combined an attempt to reduce to a minimum those parts of theatre work which did not require the specific skills of the theatre staff. If it was to be a success a revised supply service of any type must be acceptable to the users and be seen to improve the quality of the service. As regards operating theatres, the type, number and state of the instruments, drapes and equipment should meet

the requirements of theatre teams and their delivery and retrieval must be efficient.

It was around these requirements that the Theatre Service Centre was planned. Basic trays contained general instruments common to all operations, and a number of special trays provided instruments specific for a procedure such as a gastro-intestinal anastomosis or for genito-urinary operations. The trays were prepared and set out in a central area by trained domestic staff under the supervision of an experienced nurse. They were sterilised and held in store and, on demand, were despatched to an operating theatre ready for use. At the end of the operation the trays of instruments and paper or plastic containers with soiled linen, used swabs, etc., were withdrawn to the central area, where they were checked, dismantled, prepared and re-set. The theatre staff played no part in the cleaning, disposal or repair of any of this equipment and were ready within minutes for the next procedure. The service has now been functioning for 3 years, and, from a small pilot study serving 2 general theatres, it has taken over the supply of all the general theatres in the hospital except one.

To supply a large group of theatres, the Service Centre must carry a considerable stock of trays and each tray must carry a considerable number of instruments. To keep the initial financial outlay to a minimum the work-load of each theatre was studied in detail and the probable demands for any one day assessed. This allowed the Centre to carry a minimum of trays compatible with a margin of safety, recognising that an individual tray could, if necessary, be retrieved, cleaned, re-set and re-sterilised within 1½ hours. The number and the nature of the instruments on each tray was decided by representatives of the theatres involved in the initial pilot scheme. Individual requirements were catered for by supplementary packs. Some surgeons require 2 or 3 packs of this kind; others 20 or 30—most of them seldom used. With experience, surgeons have altered their requests and in some cases the contents of the trays have been changed to meet a majority opinion. To increase individual confidence at the outset, a small flash autoclave was provided for each theatre to deal with the dropped or soiled instrument. A sterile pack containing a replacement could, however, be delivered from the Centre in less time than the autoclave took to complete its cycle.

The main problems in developing the Service had been overcome and the surgical staff would not wish to revert to the previous organisation. There had been subjective benefits both in time and temper and unforeseen advantages particularly in the improvement of communications between the surgical, nursing and administrative staff. Discussions had been broadened from those of a particular theatre on an individual surgeon to theatre activity throughout the hospital or in the area. The overall efficiency of the equipment was maintained at a standard that was impossible in a single unit or group of units; the improvement in sterilisation was evident and the opportunities for cost evaluation had been increased.

The output of the T.S.C. could be improved even further and, while part of its staff will remain responsible for the production of sterile trays, the maintenance of standards of efficiency and improvement in the mechanics of the production line, others will be able to study extension of the service to cover specialised theatres, ward instruments and undertake research into the contents of the trays, including the use of disposable materials. Developments in automation could speed up the production line and remove still further the possibility of human error. From the users' point of view the Centre had proved more efficient as a means of theatre supply than anything experienced in the past. It was costly in its inception but this could be offset by output; the wider the area supplied the more economically viable the organisation would be.

Miss A. McCreath, Theatre Sister, Royal Infirmary of Edinburgh, began by outlining the work of a theatre team under the previous conditions. She highlighted the period of intense activity before the theatre session began. Sterilisers were filled and boiled—resulting in a hot, steamy atmosphere. The theatre itself was set up. The instruments for the first case being boiled, or if the "bank system" was in use, all the instruments for the list were boiled and laid out. Basins and other utensils were prepared, adding their quota to the noise of hissing boilers and sterilisers. All this took time and the rush and bustle inevitably produced tension as well as a degree of aerial contamination. During the operation, if an additional instrument was required, it had to be selected from the instrument cupboard—probably by a new nurse, unsure of herself or what to look for. Dropped instruments had to be cleaned, re-boiled and brought back to the theatre.

When the operation was completed there was a rush to clear up and prepare for the next. Soiled instruments had to be cleaned and re-boiled as well as utensils and basins. Linen and swabs were removed to another part of the theatre area and the scene was one of general activity and noise. If the operation list was changed or patients added to it, extra equipment had to be sterilised, and at the end of the sessions all the equipment had to be cleaned and checked by a theatre staff, by this time extremely tired. Linen was checked and folded, drums and packs made up and autoclaved. There was also the problem of disposing of large amounts of soiled linen, swabs, etc.; all this was a lengthy process.

For emergency work the operating theatres took a considerable time to set up—in some instances up to 45 minutes. This might be longer than the duration of the operation itself. As for elective surgery, cleaning, checking, re-packing and autoclaving had to be undertaken. On non-operating days a good proportion of the staff time was taken in major cleaning operations—"the big clean" as it was called. Maintenance of instruments and other stock had also to be undertaken.

Using the tray system, the picture changed dramatically. A list of trays and packets for an operating session was sent to the T.S.C. the night before or even on the morning of the list. Trays for the 1st and 2nd cases were delivered to the theatre in a special trolley half an hour before the list was due to begin. The nursing staff set out the appropriate lotions, suture materials and extra packs. Trays for case 3 came when case 1 was finished. If a further tray or package was required unexpectedly from the T.S.C., this could be obtained and when timed on one occasion delivery was accomplished in 45 seconds. On completion of an operation, the trays, linen and swab bags were

collected by a "soiled return truck", which came from the T.S.C. when requested by the "intercom" system. The next trays were then brought into theatre and the theatre nurse could "scrub up", knowing that all requirements were available for immediate use. There were no more heavy sighs, tapping of feet or pulling of gloves as an impatient surgeon waited! At the end of a list virtually all that remained to be done was the cleaning of furniture and walls. There might be some work with, e.g., needle sets, but this was minimal compared with the former regime. One theatre sister claimed that she could be out of the theatre 5 minutes after her surgeons, but this was perhaps a slight exaggeration.

For emergency surgery trays were sent up on request. The theatre could be prepared in 5 to 10 minutes. During the night, supply and soiled return trucks were retained in the theatre and there was a key for the theatre service store in case of shortage or a need for specialised instruments. On non-operating days the "big clean" was a thing of the past and theatres could be used for instruction of nurses and medical students.

Miss McCreath summarised the difference between the two systems under certain headings:—

Stress and Strain

This is noticeably reduced. The theatre sister was confident that the instruments and equipment were immediately available. The new student nurse knew the contents of general instrument sets and the problem of hurried instruction was avoided. There was no rush to scrub instruments in time for the next case—a race against the clock in the case of a fast surgeon or a short operation. Junior nursing staff did not require to locate and sterilise instruments with which they were not familiar and there was time for them to observe the work of the scrub nurse and participate as a member of the theatre team and even obtain "scrubbing up" experience. At the end of a list staff is less tired and there is an opportunity for more effective teaching.

Sterility

The staff knew that the trays and packs were sterile. This did not always apply in the former regime. The removal from the operation area of all materials used in the previous case before the next operation was bacteriologically sound particularly after an "infected" case. All contaminated or potentially contaminated instruments and linen were handled only by the scrub nurse, whose protective gown and gloves were discarded last into the appropriate bags.

Speed

Theatres can be prepared much more quickly—a feature of particular value in emergency surgery.

Silence

Patients waiting in anaesthetic rooms prior to operations were spared the mysterious noises of the adjacent operating theatre, the murmur of voices, chinking of instruments, hissing and bubbling of boilers and occasionally the clatter of a dropped basket of instruments, a basin or bowl. This was aggravated for the patient by the sight of masked figures flitting hurriedly hither and thither as was necessary with the previous method. With the tray system, noise is undoubtedly reduced. This has been noticed and commented upon both by staff and patients.

Standardisation

Once a nurse had gained initial "scrubbing" experience, she could go to any theatre and take any type of case. She might never have seen the surgeon before but she would be familiar with trays set out in exactly the same way. This would make theatre nursing staff more mobile and more confident when helping out in other units.

In conclusion, Miss McCreath submitted that the tray system enabled all grades of theatre nursing staff to give a better and happier service to both surgeons and patients. Since the system was instituted at the Royal Infirmary of Edinburgh, no nurse had expressed the wish to go back to the old system.

Mr. A. I. S. Macpherson, Constultant Surgeon and Chairman of the Theatre Service Centre Committee at the Royal Infirmary of Edinburgh, and **Dr. J. Bowie,** Bacteriologist, University of Edinburgh, also commented on the introduction of tray-top service at the Infirmary, and a short film representing the old and the new systems was shown.

Mr. A. G. Hutchison, Consultant Urologist, Victoria Infirmary, Glasgow, spoke on problems concerning the sterilisation of endoscopes and, in particular, cystoscopes. At one time the phenomenon of "bougie" shock was thought to be due to the introduction of organisms on a bougie or cystoscope. It was now accepted that this was an endotoxic phenomenon resulting from the patient's own dormant organisms. Recent reports of post-operative infection in urology suggested that the organisms involved might be other than instrument-borne. Some might even conclude that a clean endoscope was as acceptable as one which was sterile.

Outpatients undergoing endoscopic procedures under general anaesthetic might already be infected, but even so they were unlikely to spread the infection in hospital, though some patients may have to be admitted. In a recent session of 15 out-patients, 7 were new and had sterile urine. Of the 8 return patients, only 1 had infected urine. In-patients were more likely to have some infection as a result of catheter drainage in the wards.

Mr Hutchison outlined the various types of cystoscope, biopsy instruments and diathermy equipment in current use at the Victoria Infirmary. This showed the variation in the types of instrument required and examples of work at particular outpatient sessions illustrated the need for sterile storage of a variety of instruments. For the sterilisation of delicate lens-system instruments, various methods were reviewed:—

1. **Liquid**

   Oxycyanide of mercury was used but has not been employed for some years. Its efficacy remained in doubt.

20 per cent Hibitane gluconate in 70 per cent alcohol

This was satisfactory if no dye was employed and if instruments were thoroughly cleaned and taken apart before immersion. It might, however, have a "fogging" effect on a lens.

2. **Heat**

Pasteurisation

Immersion in a thermostatically controlled bath at 70–75 degrees centigrade for 10 minutes was theoretically good, but spores were not killed, bubbles may prevent penetration and agitation displace lens mounts.

Boiling

Boilable cystoscopes were available. Some urologists used them, though the life of the instrument tended to be short if boiling was thorough.

Low pressure steam

At 80 degrees centigrade this was similar to pasteurisation. It might be improved by formalin vapour, though this is an irritant. Spores might not be killed and there was a danger that lenses would become fogged. The process took 20 minutes.

3. **Vapour**

Formalin vapour

This was mentioned only to be dismissed. Efficacy depended on concentration and penetration, both of which were uncontrollable. Irritant qualities raised difficulties and sensitivity to it was not infrequent.

Ethylene oxide gas

An effective killer of micro organisms and spores. It was, however, relatively expensive though this could be controlled by using small quantities, e.g. in a pressurised canister rather than a large cylinder. The explosive danger was overcome by admitting the gas to a vacuum and extracting it to the outside atmosphere. As ethylene had toxic qualities, especially to mucous membranes, it was important that instruments were well washed and dried before exposure to the gas, or it might adhere to the surface and cause irritation. A special steriliser must be used. Using the Victoria Infirmary ethylene oxide steriliser Mark 2, instruments were first washed, dried and packed in double heat-sealed polythene. Air from the pack was extracted—otherwise its expansion during vacuum could damage other instruments. A cycle of vacuum, gas entry, sterilisation (under time and temperature control), further vacuum then entry of filtered air was begun by piercing the gas canister. The process was monitored by a test paper and by spores of B subtilis (globigii). Careful records of each procedure should be kept.

The following cycles have been used:—

(*a*) Unwrapped instruments—1 hour at 60 degrees centigrade.

(*b*) Polythene wrapped instruments—2 hours at 40 degrees centigrade.

(*c*) Polythene wrapped instruments—12 hours at 30 degrees centigrade.

The shortest time for sterilisation was 1 hour.

In practice 6 instruments might be required in 1 hour and during the 1½ hours in which they were being washed, dried and sterilised, a second group of 6 instruments might be needed. The first 6 would then be ready for further use. Thus 12 instruments would be required at the start of the session.

Ethylene oxide gas did not damage the metal or the lenses and irritation only occurred if traces were left on the surface of the instruments. Displacement of lenses from mounts could occur during the drawing of a vacuum: this had been reported, but had not been encountered at the Victoria Infirmary.

It was Mr Hutchison's view that endoscopes were best looked after by a permanent member of the staff of the department. A technician could undertake sterilisation after a simple course of training. The more these items of equipment were handled, the greater the amount of damage sustained. The central supply of endoscopes would require a greater number of instruments. Whether dealt with in the department or centrally, a high initial outlay would be required and might be justified by complete microbiological safety and prolonged instrument life.

Mr. A. J. G. Percy, Director, Messrs. Down Bros. and Mayer & Phelps Ltd., noted that since 1948 certain aspects of surgical instrument manufacture had been influenced by the development of sterilising services and by an increased demand for certain patterns of instruments. Changes in demand had led to changes in methods of production.

It was not always appreciated that many procedures were involved in the production of even a simple instrument and that a skilled worker took 3–5 years to train. For some instruments, line production with semi-skilled work was possible, but special items and more sophisticated instruments required the individual attention of a skilled instrument maker. For certain instruments machine production and drop forging were suitable. B.S.I. specifications were followed and although instrument manufacture was a relatively small industry, it exported no less than 50 per cent of its production. The demand for British made instruments was world wide and export work held a considerable degree of priority.

If surgeons were willing to standardise a range of surgical equipments, this would assist manufacturing firms to meet the demand. Standardisation might, however, require to be national in scope to affect supply to a significant extent. It might be possible, for example, to standardise "general approach" instruments, e.g. clips, retractors, etc., even if more sophisticated items were required in greater variety. It was noted that the manufacturing industry could not meet sudden demands for special types of instruments and that it was impossible for these firms to keep stocks of every item shown in their catalogues.

In conclusion, Mr Percy noted that the industry was anxious to co-operate with surgeons, particularly in development work, but that there was an impression in the instrument trade that they had become

more remote from the immediate user since the National Health Service was established, as an administrative barrier had appeared between them and the surgical staff.

Dr. Cameron Weymes, Group Medical Superintendent, Victoria Infirmary, Glasgow, stressed at the outset that any new system of sterile supply for theatre instruments must be practicable, safe and be given the right position in relation to other priorities. It was an unfortunate characteristic of the Service that development was slow. At the Royal Infirmary of Edinburgh experiments began in central sterilisation of theatre instruments in 1961, yet by 1968 no Scottish teaching hospital was on a full service. To allow critical evaluation in time to guide subsequent planning, it would have been better to develop a complete service in one hospital as a matter of urgency.

In 1964 Building Note No. 26 was circulated in draft and in 1965 its requirements as regards theatre sterile supply units (T.S.S.U.) were made mandatory in planning new operating departments. The Western Regional Hospital Board had considered the implications premature, i.e. that T.S.S.U.s should be embedded in main theatre suites, deal with instruments only, be provided for suites of 4 or more theatres, and that flash sterilisers should be included. Units of this kind were untried and had not been costed. In addition more than half the theatres in Scotland were in groups of less than 4. In 1966 money was made available by the Department for further studies and these were being undertaken at the Victoria Infirmary, Glasgow, where there were 10 theatres. As the supply centre was not in the theatre suite this would allow extension of the service outwith the hospital. In developing the experiment certain problems and lessons had emerged:—

1. **Standardisation**

It was important to achieve this as far as was possible both within and between specialties. This involved numerous discussions with the users, the study of samples of instruments and confirmation in writing that certain decisions had been reached. About 6 months were required for these discussions per major specialty, including sets for X-ray work, cardiac catheterisation, cardiac arrest, tracheostomy, etc. About 100 sets were required for the group.

2. **Supply**

This had required up to 1 year per specialty. A delivery time of 15–18 months was experienced; once the instruments were received expansion was not difficult. One additional theatre had been serviced with instrument packs each 3 weeks since August 1967.

3. **Accommodation**

A minimum of about 1,000 sq. ft. was required with perhaps 2,500 sq. ft. for a regional centre supplying perhaps 15 theatres and related wards, etc. It was important not to embed this accommodation in the theatre suite.

4. **Equipment**

(*a*) **Ultrasonic washer**

The ultrasonic washer was used to polish instruments. The addition of 10 per cent citric acid was useful in this connection.

(*b*) **Jet washer**

A machine had been developed which required about 4 sq. ft. of space and had a cycle which was automatic or manual. It included a cold wash, a wash with detergent at a selected temperature, a hot rinse followed by drying at 3 different temperatures: 100 degrees, 75 degrees and 50 degrees centigrade. The cycle took approximately 20 minutes. One machine would suffice for the largest sterilising centre.

(*c*) **Pulsing autoclaves**

Two, with possibly a third as a reserve, would suffice.

(*d*) **Ethylene Oxide sterilisers**

A small one, e.g. 1 cubic ft., was required for endoscopes, grafts, pacemakers, etc., which were heat sensitive; a larger unit, say 15 cubic ft., for equipment for renal dialysis, heart/lung equipment and most types of ventilator.

Dr. Cameron Weymes considered that gamma irradiation had no place in the National Health Service. Units were expensive, and if radiation was required, it could be undertaken commercially.

(*e*) **Staff**

A suitable person in charge of the unit was most important, and scales of salary in the range applicable to administrative and clerical staff had been agreed. The staff might consist of—1 senior nurse and 1 nurse, together with 1 assistant (ancillary staff grade 5) for each 2 theatres served. Male attendants were not required unless heavy lifting was anticipated.

(*f*) **Method**

For theatres in the Infirmary the processing of material took about 1 hour. Storage was not undertaken in the Central Department. Cardboard boxes with liners were used and had been found effective.

(*g*) **Costs**

It was estimated that before the introduction of the Central Service, the capital cost was £1,500 per theatre. This had risen with the service to some £3,500 per theatre in the teaching hospital. It was expected to drop to approximately £2,500 per theatre for the whole group, taking into account the less elaborate needs outside the teaching hospital. Running costs were approximately £750 per annum per theatre. This was mainly composed of salaries, and the total per theatre should drop as the service extended.

(*h*) **Nursing staff**

No saving in nursing staff could be claimed. Previously there were 18 nurses for 10 theatres, which represented an absolute minimum. The new system was, however, a great improvement at night when less experienced staff might be on duty. There was some saving in nursing time, though no economy in numbers of nurses.

(*i*) **Sterility**

It was not claimed that an improved standard of sterility had been achieved.

(*j*) **Size of unit**

While a central service would be justified in relation to large theatre suites, 4-theatre units might not be viable economically. They might encounter problems due to staff illness and be wasteful in equipment. A centre to serve 15–25 theatres and providing ward instruments for 2,000 to 3,000 beds was recommended.

In conclusion, Dr. Cameron Weymes noted that the need for further study was urgent. It was important to examine the particular requirements of orthopaedic, E.N.T. and plastic surgery, and essential to reach as wide a degree of standardisation as possible. It might be possible, for example, to decide on a smaller range of commonly used instruments and on basic questions such as the adoption of screw or box joints. It was suggested that the Royal Colleges of Surgeons in Edinburgh and Glasgow might assist in achieving the degree of standardisation which would be acceptable to users, and allow the more efficient development of the service.

DISCUSSION

Mr. D. Miln, Consultant Surgeon, Stobhill Hospital, Glasgow, opened the discussion by noting that while considerable progress had been made in the practical study of sterilisation and the presentation of surgical instruments, certain questions remained unanswered. He noted that the main objectives were increased efficiency and safety without unrealistic levels of cost. The South Eastern Regional Hospital Board booklet, "Theatre Service Centre"—December 1965—was referred to as an important contribution to this subject.

Points which still required discussion included the reliability of essential equipment, the ease with which new items might be introduced into standard instrument sets, and the number of special sets which might be required. Again, should items such as gowns be incorporated with instrument sets, and could the variety of gowns be reduced? Could ethylene oxide be relied upon in all circumstances to kill pseudomonas in endoscopes, and what range of disposal items might be incorporated in pre-set packs in replacement of e.g. expensive metal gallipots? Human problems were also important as regards communications and in recognition of the fact that radical changes might be more difficult for established surgeons to accept than for more junior staff.

In the ensuing discussion, the following were the main points to emerge:—

1. **Standardisation**

Various aspects of standardisation were referred to:—

(*a*) **General "approach sets"**

A greater degree of standardisation of instruments for sets of this kind appeared practicable and was, indeed, urgent. Common user items in this general category might form more than half the number of surgical instruments; this represented a very large sum of money. Lists were being prepared using general terms such as "haemostats"; these would still require definition and would be variable as regards costing. A decision on "box" or "screw" joints might have to be taken and the difficulty of using the non-touch technique with "box" joints was noted.

(*b*) **Degree of standardisation**

If the need for a degree of standardisation was accepted, an early decision would have to be taken whether this should be on a national, regional or hospital group basis. In this connection it was noted that approximately 3,000 items represented a critical figure in the manufacturing process for, e.g., artery forceps. It was suggested that items such as artery forceps in 3 sizes, toothed, non-toothed dissecting forceps and scissors in 2 different lengths, would represent a large proportion of the total requirements of instruments.

(*c*) **New developments**

The hope was expressed that if efforts towards greater standardisation were successful, care would be taken to avoid the frustration of new developments.

(*d*) **Endoscopes**

The need for variety reduction was noted and the fact that British products of a high standard were available.

(*e*) **Further action**

If it were possible to achieve reasonable unanimity on a basic list of commonly required instruments, this would strengthen the position of the Central Supplies Department and permit more efficient and orderly liaison with manufacturers. It was suggested that in pursuing this objective, the large committees should, at all costs, be avoided, but that help in this might be obtained from the Royal Colleges of Surgeons in Edinburgh and Glasgow. It was noted that an extensive level of standardisation was accepted by surgeons during the War. Others considered that a hospital group might be a sufficiently large area within which to seek standardisation, and that a wider approach might inevitably become too theoretical and be less easily accepted.

2. **Theatre Service Centre (T.S.C.), or Theatre Sterile Supply Unit (T.S.S.U.) and Central Sterile Supply Department (C.S.S.D.)**

There was some discussion whether both types of unit were necessary at any hospital. A specialised unit for surgeons' requirements in operative work and for diagnostic units at a group of hospitals (T.S.C. or T.S.S.U.) would not necessarily require direct support from a C.S.S.D., and it was possible that dressings and ward packs might be more economically obtained direct from industrial sources.

3. **Sterilisation**

It was noted that ethylene oxide killed vegetative organisms, spores and viruses, and that there was apparatus which could deal without difficulty with most types of ventilator.

4. **Storage of trays**

Where trays were retained at each operating theatre, a larger number were temporarily out of circulation. Central storage of pre-packed trays reduced the number required.

5. **Delays in supply**

The importance of forward planning was stressed and the fact that this would be welcomed by manufacturers, viv-a-vis their production programmes. Larger orders would normally result in some price advantage. If it were possible for Boards to estimate 3 or 4 years ahead for even a proportion of types of instruments, this would assist both manufacturers and suppliers.

6. **Quality**

Anxiety was expressed over deterioration in the quality of some instruments; examples were given of batches in which a large proportion had to be returned to the makers. The existence of B.S.I. standards and of information in technical memoranda was recognised in this connection.

7. **Repairs**

Long delays in getting instruments back from repair, particularly cystoscopes, were noted. It was explained that only 3 relatively small companies were involved and that damaged cystoscopes were eventually returned to them. A small number of skilled workmen were available and this led to delay. It was stressed by manufacturers that some expensive instruments returned for repair were in an appalling state. Some had obviously been carelessly handled: some badly parcelled and damaged in the post. This added force to the view that highly specialised instruments should be retained under the care of one person in the department where they were used.

8. **Special instruments**

It was accepted that pre-set packs had been developed mainly for general surgery, and that further discussion was necessary in relation to suitable packs for specialties such as orthopaedics and E.N.T. Surgery. Delicate instruments represented a special problem, particularly, perhaps, in ophthalmology.

9. **Alternative materials**

The possibility of introducing other materials such as polypropylene was noted. Moulded plastic retractors might be useful for example in emergency work, though many still considered that stainless steel of good quality would remain the material of choice for most instruments.

10. **Design aspects**

If used material was efficiently bagged prior to removal and a collection point provided, the need for a "disposal" or "soiled return" corridor in an operating theatre suite was questioned. It was represented that the architectural plan must facilitate the proper movement of people, air and things and that a "soiled return" route assisted in this. From the architectural point of view, however, it was stressed that a firm bacteriological view was a necessary pre-requisite to planning. This was also important in the design of intensive therapy units and in the planning of T.S.S.U.s, where in the past separate "clean" and "dirty" areas had been prescribed. Insistence on sharply differentiated areas, particularly with the inclusion of air-locks and "pass-through" storage, had important nurse-staffing implications.

Points in favour of a "disposal" corridor were that it allowed used material to be taken out of theatre while the list was still in progress, and that it permitted access by technicians for repair and maintenance work while the theatre suite remained in normal use. On the other hand, it was suggested that with suitable staff and trolleys, used material could be disposed of safely without a separate route if a disposal room or holding bay at each theatre was available and easily accessible. This would, of course, require carefully controlled air pressures.

11. **Further studies**

The need for further study was emphasised. Wound and chest infection rates from units using pre-packed instruments and others following the older type of regime would be particularly important.

January 1968.

AMBULANCE SERVICES

Normal use of potential areas of abuse by ambulance services was reviewed together with related questions of organisation, finance and training. Many facets of the service were highlighted and the need for further studies was expressed.

Provost J. G. Robb took the Chair.

Mr. R. Marshall, Secretary and Treasurer of the St. Andrew's Scottish Ambulance Service, outlined its organisation and its role within the framework of the National Health Service. The fundamental difference as compared with England and Wales, where the service was provided by 142 Local Authorities and the cost divided between ratepayers and tax-payers, was that in Scotland there was one integrated service under a contractual agreement between the Secretary of Sate and the St. Andrew's Scottish Ambulance Service. The cost was found by the Exchequer; Scottish ratepayers did not contribute in any way.

The Scottish service had a staff of 1,084; this included 853 drivers and attendants. A fleet of 756 vehicles, including 630 operational ambulances, was distributed strategically throughout Scotland at 196 depots ranging from the Shetlands to the Borders. With headquarters in Glasgow, there were four area ambulance officers in the Western Region and a regional ambulance officer in each of the other Regions. The estimated mileage for the current financial year was 12,930,000, and the number of patient journeys 1,720,000.

The first obligation was to operate an efficient accident and emergency service. Contrary to widespread belief, there was no obligation to convey all patients suffering from illness, but only those for whom special transport by ambulance was necessary. Various circumstances, however, had obliged the ambulance service to transport vast numbers of walking patients to and from hospital out-patient departments: such demands now constituted about 80 per cent of all ambulance patient journeys. Physiotherapy departments were by far the greatest users and, together with orthopaedic and fracture clinics, accounted for about 60–70 per cent of the total requirement for ambulance transport of out-patients. To tackle this enormous task economically, and as separate fleets for stretcher and sitting patients could not be afforded, dual purpose ambulances, which were by no means ideal for the very ill and far from comfortable for sitting patients, were used to a large extent.

Ambulance men required the ability and knowledge to ensure that very ill and seriously injured people were conveyed to hospital without deterioration, and also the outlook of a bus driver responsible only for the safe handling of his vehicle and passengers. With 80 per cent of his work relating to the bus service, some frustration was almost inevitable. He was aware that at least a third of his passengers should never be on the "bus" at all, and he was required to exercise his skills in first-aid relatively infrequently. In effect, over the whole country, tens of thousands of free passes were being issued at the expense of the efficiency of the ambulance service.

Responsibility for deciding whether an ambulance or hospital car was needed should rest squarely on the shoulders of the medical officer in charge of the patient. Whether or not he should travel by public transport, any limitations, e.g. on the distance he might walk, and the need for an escort should be stated. If he required to be carried by stretcher or needed two people to assist him to and from the vehicle though not requiring a stretcher, should be noted, and also if a doctor or nurse was required as an escort in addition to the ambulance crew.

In few hospitals were assessments of need made and requisition forms signed by doctors alone. In the majority, several grades of staff—sisters, physiotherapists and even student nurses might authorise transport. Some delegation to nursing and other staff could, of course, be appropriate, but authority to take decisions on medical grounds should be taken by a doctor and forms signed on his behalf only when he himself could not do so. It was recognised that before ordering an ambulance doctors and nurses might not have time to ask the more fundamental questions concerning public transport or to arrange private transport, but the problem should not simply be passed to the overloaded ambulance service, and even for blame to be attributed to that service when patients complained about inevitable delays.

On several occasions the Ministry of Health and the Scottish Home and Health Department had recommended the nomination of a transport officer at major hospitals to co-ordinate requests for transport from various wards and departments. In only a few cases had this recommendation been effectively implemented. If such an officer were appointed, he would be in a position to make the necessary enquiries and take decisions on authorisation, referring doubts and difficulties to the medical staff. The ambulance service had found it necessary to appoint its own co-ordinating officers at a number of hospitals but, although they worked closely with hospital staff on general ambulance matters, their principal duties were to co-ordinate ambulance journeys. These jobs could be handled by one officer, and if both services contributed to the costs, the way would be open for such appointments at many more hospitals.

There was a need for hospital authorities to review arrangements for the authorisation of transport and to ensure that staff, arranging appointments for patients requiring transport, understood the operational problems of the ambulance service. A study of the need for ambulance transport of patients attending physiotherapy departments would eliminate many unnecessary journeys. In this connection it was not uncommon for patients to be conveyed long distances and by-pass fully equipped hospitals. This occurred when the patient had attended the more distant hospital, perhaps after an accident, and the consultant had authorised physiotherapy there. In such cases it ought to be possible for treatment to be given at the hospital nearer the patient's home and for him to return to see the consultant on the completion of treatment or at intervals as necessary.

The delay of ambulances at many hospitals was excessive and the hospital service could assist in preventing this. Many hospitals had no central reception for patients and insufficient portering staff.

Inadequate facilities for manoeuvering vehicles caused delay and increased the time off the road for repairs due to bumps and scrapes. Failure to cancel pre-arranged ambulance journeys when transport was no longer needed was common, and "bunching" appointments over-taxed the service. Between 80 per cent and 95 per cent of appointment times fell between 9.30 a.m. and 10.30 a.m. and between 2.0 p.m. and 3.0 p.m. It was impossible for the ambulance service to cope efficiently and economically with such concentrated demands; they inevitably resulted in patients arriving late. Others waiting for an ambulance long after their appointment time, became anxious and phoned the hospital, thereby creating additional work. Spreading physiotherapy appointments, in particular, would undoubtedly reduce late arrivals. While it was accepted that the hospital service had a shortage of staff, the ambulance service was suffering in this respect even more acutely and bore an unfair share of the burden of criticism. If the hospital service could reduce ambulance out-patient demand by even 20 per cent, which seemed an easily attainable target, an incomparably superior ambulance service could be provided.

In March 1966, the report on Training by a working party on Ambulance Training and Equipment appointed by the Minister of Health and the Secretary of State for Scotland, stressed the urgent need for greatly extended training programmes for ambulance staff, as indeed had the Platt Report in 1962. In December 1966, in a written Parliamentary reply, the Minister of Health indicated that he was considering comments on the report and the future organisation of the ambulance service in England and Wales. Until decisions had been taken and in order that no time should be lost, he proposed to arrange experimental basic courses for instructors and ambulance staff on the lines recommended by the working party.

Training in the Scottish Ambulance Service had been obliged to await the result of activities in the South, with which close contact had been kept through a representative, Mr. J. Mulholland, on the panel of assessors. This panel had been appointed by the Minister of Health to evaluate the experimental courses of basic training started in October 1967, by nine ambulance authorities in England, and to recommend modifications for further courses. The central committee, the regional ambulance committees and officers of the service were wholeheartedly behind the proposals of the working party on training and the setting up of a school in Scotland. As considerable delay would be involved if accommodation had to be built, properties had been inspected in the hope of finding premises ready-made for a residential school. In the meantime a start might be made on a day-school basis in Glasgow and Edinburgh, as, with the neighbouring counties, these cities employed about 75 per cent of all ambulance drivers and attendants in Scotland. The main problem was finance, but if the English and Welsh Local Authorities went ahead with plans to establish eleven schools, it would be difficult to deny the same facilities in Scotland.

Dr. J. Killoch Anderson, Group Medical Superintendent, Glasgow Royal Infirmary, agreed that of patients attending out-patient departments, the greatest number arriving by ambulance attended for physiotherapy or orthopaedic and fracture clinics. In a recent check, some 25 per cent of the patients attending for physiotherapy came by ambulance. Overall, from 500,000 out-patient attendances, some 20 per cent were brought and returned by the ambulance service. These patients came from many areas and with only a very general relationship to their appointment times. This led to complaints of waiting, both by doctors and patients. For some special examinations, e.g. radiology or radio-isotope investigations, accurate timing was important; the ambulance service tried to comply with these but was not always successful. In this, the fault could lie with the hospital service, as appointments might be made an hour earlier than necessary to take account of an anticipated delay. The ambulance service got to know that a margin had been included in the timing and, understandably, might not take it seriously. This was a vicious circle, and it was up to the hospital to use the correct times in making appointments.

In general, accident and emergency ambulance work was well done, though a higher standard of staff training was desirable and should be assisted in every way by the hospital service. Lecture-demonstration sessions for ambulance personnel could form a useful part of their training. As regards out-patients, however, many difficulties arose, both as regards the collection of patients and their return journeys. Long waits were not infrequent, even although the ambulance service did all it could to keep these to a minimum. Patients waiting for a country-district ambulance, which collected patients at other hospitals, might have a return journey of several hours.

Further research, possibly by the Operational Research Branch of the Research and Intelligence Unit of the Scottish Home and Health Department would help in reaching solutions to out-patient ambulance problems. The hospital service might be too closely involved to reach fundamental solutions successfully. Meantime, however, there was no doubt that some action could be taken. It might be possible, for example, to establish a separate out-patient ambulance service—an "out-patient bus"—not painted in ambulance colours, but plain and unmarked. This "bus" could leave a certain point at fixed times and return using scheduled stops. Local ambulances could feed into this "bus" from out-lying areas. Patients and hospital staff, knowing the times, could orientate their work accordingly. Loading and unloading would be accomplished with the help of the crews of the feeder ambulances at the peripheral end and either a hospital porter or another ambulance man at the hospital. As regards staff, the "buses" would simply require a kindly driver. The "bus" might include accommodation for two or four stretcher patients and a number of sitting cases; it would require to be a purpose-designed vehicle, possibly of $1\frac{1}{2}$ decks.

Physiotherapy departments were major users of the ambulance service and there were many tales of apparent abuse. Patients might go to work on Monday, Wednesday and Friday, but require an ambulance when going for physiotherapy on Tuesday and Thursday. The ordering or discontinuance of an ambulance depended at present on a doctor and, if in the opinion of the physiotherapist an ambulance was no longer necessary, an appointment had to be made for the patient to go to a "return" clinic; this meant another day off work, another visit to the hospital and then a decision by the doctor, who

might be quite junior—a senior registrar or even a registrar. At Glasgow Royal Infirmary, with the approval of the Board of Management, permission had been accorded to senior physiotherapists to discontinue an ambulance on their own authority. It is they who see the patients at exercise and should be able to make this decision. If the patient objected, then the consultant in charge would act as the arbiter. After a trial period this change of practice would be reviewed. More use of domiciliary physiotherapy might also be considered. This could be arranged on the authority of a consultant through the patient's general practitioner. At 17/6d. per treatment, a course of twelve treatments might be less costly than ambulance journeys to hospital. It would also help the shortage of physiotherapy time in hospital.

When a patient was referred to hospital by a general practitioner for an out-patient consultation, he or she might insist on ambulance transport; the doctor had then to authorise or refuse it. The position was not easy. Patients could be extremely demanding and might threaten to take their "cards" elsewhere and to write to their local councillor or Member of Parliament. If a patient transferred to another doctor, and this involved the whole family, this could be quite serious in relation to the practitioner's list. Under such pressures the line of least resistance could be the easiest. The same applied to the hospital doctor. Instances of refusal by a consultant to authorise an ambulance had resulted in patients writing to Members of Parliament and to the Secretary of State. The complaint reached the consultant via the Scottish Home and Health Department, Regional Hospital Board, Board of Management and the Medical Superintendent. The case record had then to be consulted, a report written and the correspondence returned through the same channels. That was the last the hospital heard of the case, right or wrong. The result of this could be that the next time a patient demanded an ambulance, the request form was signed. It would support the hospital service and clinicians, in particular, if they were kept informed of the outcome when complaints of this kind were made. Even a copy of the letter eventually sent to the patient would allow the hospital authorities to know whether their position had been supported or not.

Finally, Dr Anderson raised the possibility of making a charge for ambulance journeys to out-patient departments. This might lead to controversy but there were considerable arguments in its favour, and if a "bus" service were instituted, the "fares' could be collected without difficulty.

Mr. A. R. Batchelor, Secretary, North-Eastern Regional Hospital Board, considered that the time must come when the ambulance service became an integral part of the hospital organisation. It was in effect the arm of the hospital service which reached out and placed the patient in a hospital bed or returned him safely to his home on completion of treatment.

The North-East Region, which represented the needs of both urban and rural areas, had established a pattern of ambulance concentration in Aberdeen with outlying depots in various counties when the National Health Service began. In 1954 arrangements were made to build a new ambulance centre on the Foresterhill hospital site. Being on the hospital site had greatly assisted co-ordination between the two services. This general pattern had persisted and now served some half million population. There were some 22 centres including the central depot in Aberdeen; of about 50 ambulance vehicles, a quarter were concentrated in Aberdeen. Central radio control had helped in the economic use of vehicles but, despite this, the mileage exceeded 100,000 miles per month. Although nominal overall control remained at the Aberdeen depot, a fair measure of independence was delegated to individual ambulance stations throughout the Region.

Under an instruction from the Secretary of State in 1954, which aimed to provide a closer link between the providers and the users of the ambulance service, the Regional Board held meetings of their ambulance committee at quarterly intervals, discussing the overall use of ambulances, increased usage where this occurred, reports on complaints received and action taken. Discussions were also held between representatives of the various constituent bodies—hospital service, general practitioners, voluntary organisations, etc. The main difference in the situation from 1st April last was that the chairman of the regional ambulance committee was not only a member of the Regional Board, but also a member of the central ambulance committee in Glasgow, and thus able to act as a direct link between the central and local committees. A further difference was that whereas previously the regional ambulance committee was a committee of the Regional Board, it was now a committee of the central ambulance body.

The committee would be closely involved in any disagreement between the ambulance service itself and the users. There had been, for example, protracted discussions over a practice of many years' standing in which ambulance staff conveyed patients from ambulances to the hospital bed—a system claimed by the hospital authorities to be to the advantage of the patient as it avoided the transfer of patients from one set of conveyers to another and the transfer of equipment. With the greater use of ambulance transport and the need to economise in the use of vehicles and staff time, the ambulance service required this practice to be brought into line with the system elsewhere, i.e. that hospital staff took over the patient when he arrived at the hospital door. On the financial side, problems arose when developments occurred in the hospital field such as the opening of a new clinic or a day hospital which had direct implications on the ambulance service, if it was not involved in the events leading up to the new demand. In discussions of this kind it was obviously an advantage for the individual authorities to have as close liaison as possible.

The economic use of the available transport postulated tight schedules and detailed organisation. From the hospital point of view, there was a need to ensure that the desire for economy was not made the excuse for unnecessarily long and tiring journeys for patients who might be subject to a "milk-run". It was clearly the hospital authorities' reponsibility to ensure that due notice was given to the ambulance authorities of likely requirements. The sooner any attitude of "we" and "they" was removed, the better. When the regional ambulance officer had had his office in the Regional Board and could discuss problems directly with officers of the Board in adjoining rooms, there had been a considerable sense

of active participation by both sides; the ambulance officer came to be looked upon as "one of us".

Where there was a wide variation of requirement between heavily urbanised areas, a rural hinterland and the sometimes dramatic needs of remote island communities, flexibility in use and devolution of responsibility were essential. In the more isolated parts of the mainland provision had to be made by contract with a local transport firm or garage and sometimes by a joint appointment between the ambulance service and the local hospital. The introduction of regional ambulance committees as direct agents of the central committee should take the place of local voluntary committees and achieve a greater degree of flexibility in use. They could review the adequacy of existing facilities and consider the advent of air transport to cover island responsibilites. Improved landing techniques and the use of helicopters opened up wider possibilities in this vital but expensive form of transport. This required the delegation of authority to responsible individuals for emergency use. Again, the use of rail services in connection with ambulance services could be reviewed where this was practicable. Other problems which the regional ambulance committee could review included double-manning and escort duties.

The functions of the regional ambulance committee in relation to financial responsibility, still required clarification and awaited the central committee's view of the actual operation of the committees over a trial period. Unless such a body was entrusted with financial responsibility and liability, and in a position to control the actual expenditure, both revenue and capital in their own area, it was unlikely that they could take a truly responsible attitude to questions of need and demand and the organisation of the service within their region.

The function of the central ambulance committee should be concerned primarily with major expenditure—new buildings, acquisition of vehicles and equipment, training and the co-ordination of overall policy. The day-to-day functional responsibility, including revenue finance at least, should be delegated. Ultimately, delegation of this responsibility to the Regional Hospital Board should be the aim with the central ambulance committee acting in a purely advisory capacity. In the meantime it was the job of the regional ambulance committees to do everything they could to facilitate the fullest co-operation of the several bodies they represented in the overall interests of the patient.

Mr. I. Campbell, Consultant Surgeon, Belford Hospital, Fort William, noted that there were particular problems associated with the running of an ambulance service in the North, North-West and in the Islands of Scotland. While the lay public and Hospital Boards realised that the more highly specialised and exotic forms of treatment were not universally possible, it was more difficult to convince them of the very real difficulties in providing an efficient ambulance service throughout the country. The factors, which were illustrated by slides, included:—

1. A small population, some 188,000, including only a few main centres. The combined population of the three main population groups amounted to 75,000 people, while a greater number were scattered over an area of some 10,000 square miles.
2. The geography of the country was difficult. On the mainland the three main centres of population were in the East. The terrain ran mainly from West to East, so that communications were on the whole in this direction. This meant that it was almost impossible to link scattered communities in the West in any direct way, and in some instances the only egress was by sea as the inland communications were along narrow paths on the top of cliffs.
3. The state of the roads was variable. The main trunk roads were good by Highland standards, but the roads running to the western seaboard were narrow and winding and in some cases poorly surfaced. On these roads ambulances might have long distances to cover and journeys were uncomfortable. Access to some crofts and isolated farms was by primitive tracks, and it could even be impossible to take a four-wheel drive vehicle to the patient. Patients might have to be carried over bogs and streams to the nearest point the ambulance could reach.
4. Ferries might be unable to function because of weather conditions, tides or during the hours of darkness. Long, round-about journeys might have to be made, which added considerably to the discomfort of the sick or injured patient. Occasionally, communications broke down completely.
5. Weather conditions and tourism contributed to the problem. In the West, snow was not so common but severe frost could make conditions almost impossible, particularly on the less used routes. In summer, hoardes of motorists from urban areas ambled along without regard to passing places, and the hazard from heavy vehicles appeared to be greater. In these circumstances journeys might take twice as long in summer as in winter, when the traffic was less dense.

Except for a full-time ambulance centre in Inverness and a hospital centre in Stornoway, the ambulance service was dependent mainly on contractors. Contractors had other work but must be available twenty-four hours a day, seven days a week, and this meant being on a telephone and prepared to answer an ambulance call immediately. Such calls might be infrequent, but could involve long journeys which entailed the contractor being away from his base for many hours. Most gave very valuable service to the community. A few were less dedicated and occasionally difficulties arose. Many kept their vehicles warm and had electric blankets plugged in while they were in the garage, others did not and complaints arose from vehicles being cold, blankets damp, etc. Again, where there was only one vehicle, delays occurred if another call came in when it was engaged on a long journey.

The vehicles had to be "flexible". They must be comfortable, able to negotiate bad roads and have a good ground clearance. They should be reasonably fast, as they had long journeys to undertake, and should be able to cope with snow and mud, be well insulated and warm. It would be an advantage if water was available in the vehicle. Confinements might have to be carried out en route and a small wash-hand basin for emergency use would be

valuable. Disposable bedpans, urinals, etc., could be buried and were preferable to the suggestions of incorporating a chemical closet. The design of the ambulance required a new look, and in this the manufacturer should be prepared to work in close liaison with the medical and nursing professions.

The provision of escorts was a difficult problem. Double-manning of peripheral ambulances was not practical and, while the W.V.S. and Red Cross provided this service in some areas, it might be extremely difficult to contact a volunteer, particularly in the hours of darkness or where communications were poor. District nurses undertook this duty on occasion, but this meant they had to leave their particular area uncovered during their absence. Relatives might act as escorts, but this was not always desirable. Where a patient was seriously injured or unconscious, some form of trained person should act as escort, as the dangers of inhalation of vomitus, obstruction of breathing or excessive bleeding represented real and trying experiences even for an expert.

The main calls of the service in the Highlands concerned the transport of ill patients to hospital and the transport of out-patients to clinics at hospitals. Public transport was notoriously bad in some of the areas, and its use for out-patient attendances might mean the patient's absence from home for a whole day or perhaps longer for a ten-minute consultation. This was not realistic for the old or infirm, or for the very young.

The transport of patients to physiotherapy departments represented a considerable proportion of the work. During the past month, in the Fort William area, 4 per cent of patients attending out-patient clinics came by ambulance, the rest making their way by car, bus, train or on foot. 33 per cent of patients attending the physiotherapy department came by ambulance. In some cases it would be cheaper to keep the patient in hospital than to have him attend for physiotherapy by ambulance. Pressure on hospital beds precluded the admission of patients for physiotherapy, but if day centres were set up on a large scale as, for example, for geriatric patients, the demands on the ambulance service would be such that an auxiliary service based on hospitals might be required.

Accidents leading to injury occurred on the road, in climbing and from ski-ing. Road accident casualties had the advantage of being injured in reasonably accessible situations. This was not so on the hills, and the evacuation of injured in these cases could immobilise an ambulance for a prolonged period. In a period of six months in 1966–67, 86 patients required an ambulance to turn out on 59 occasions at the Ski Centre at Aviemore. From the outer islands, life-boats, small boats or hired launches might be the form of evacuation in the first instance, with onward transmission by ambulance or by air.

The forms of air transport currently available included:—

(*a*) Charter of the air ambulance.
(*b*) Sitting patients carried on regular flights.
(*c*) Special arrangements for the transmission of stretcher cases by regular passenger flights.

These arrangements worked satisfactorily and the patient might be transferred from Uist to Glasgow in less time and more comfortably than, perhaps, a patient from Berwick to Edinburgh, particularly in the winter.

The use of helicopters received much publicity. In summer, in daylight and in certain circumstances, this was an ideal method, but in darkness or where conditions were poor, the helicopter service was of little help as at present organised. They had their own risks to the patient, escorts and crew when forced down in some inaccessible place. In the past nine years Mr. Campbell had not used a helicopter to transfer a seriously ill patient. These had travelled by ambulance with intravenous drips, intratracheal tubes, etc., and accompanied by skilled escorts with instructions to seek aid en route if necessary. Patients had been transferred to Fort William by helicopter, but on consideration of all the circumstances their use did not appear justified. Many of the difficulties might be overcome, however, if a regular helicopter service became the main method of linking scattered communities, e.g. for the transport of food supplies, fuel, mail, etc. Such a regular service might be used for ambulance purposes when required, as the pilots would be more familiar with the terrain than service personnel at present called upon in the case of emergency. Even if a helicopter service became practicable, it would only diminish the requirement for ambulances, as patients would still in many instances have to be transported to the helicopter.

In conclusion, Mr. Campbell considered that centralisation of the service was not the answer. There must be, in his opinion, devolution of authority and administration to regional ambulance committees and local ambulance committees should be resuscitated so that local conditions might be fully understood and represented. The central committee, as a remote body, should deal with broad principles. it should negotiate contracts for the types of vehicle required, type of equipment, training of personnel and deal with the various trade unions, conditions of pay and service and broad principles of finance, but the main work of running the service and the appointment of contractors, etc., should be the responsibility of the regional committees. Local ambulance committees might help with the supply of escorts. They would know the local problems and the local contractor, and would permit the consumer to play a part in the efficient organisation of the service.

Mr. V. Whitaker, Chief Ambulance Officer, West Riding of Yorkshire, pointed out that there was a considerable difference in the Scottish and the English organisations. In the South it was rather like a patchwork quilt, with 142 patches, each of a different size and quality and with its own colour and style of vehicle. The quilt covered the bed, but not as efficiently as if it were a complete blanket of the type which could be provided in Scotland, with one service under one management.

In the West Riding of Yorkshire, ambulance cover was provided for the second-largest county in population and in administrative area in Britain. Last year 678,500 patients were conveyed over 4½ mllion miles with a fleet of 171 operational vehicles, all equipped with radio, and with a reserve pool of 18. The service was self-contained with vehicle workshops providing facilities for repairs and repainting, and a full-time residential training school where, in addition to standard courses, development studies and courses in man-management were undertaken.

In the organisation of an ambulance service, it was

important to recognise the self-determined movement of patients from country districts to various hospitals —the "patient flow" This was an important influence in defining various areas of service. Apart from an increase in the volume of patients carried, this "flow" had remained constant until relatively recently, when other factors began to exert an influence, for example, the centralisation of certain specialities such as thoracic units and burns centres, the development of day hospitals, psychiatric out-patient clinics and out-patient surgery.

Hospitals aimed to improve their bed-turnover, and the more efficient use of hospital beds led to a rise in requirements for medical transport and more "ex in-patients" became "out-patients". It was necessary to plan ambulance work in advance and this required some prediction of factors influencing the "patient flow". Without advance knowledge, which might entail the provision of additional vehicles and staff, the level of ambulance provision was bound to deteriorate as the service became overloaded.

Mr Whitaker explained how in his area consultation between ambulance officers and group secretaries had been developed. It was not always appreciated what an increase of a few patients might mean to the ambulance service. It had been assessed that out-patient running time averaged half an hour per patient, 15 minutes in, 15 minutes out. If suddenly required to bring, for example, 20 geriatric patients to a day hospital on two days a week, this entailed having to find 10 hours of additional running time a day or 20 hours a week. This was not easily found in an already crowded schedule. In fact, the increased ambulance service demand had reached a crisis point; in the West Riding the increase last year was 25,000 patients, and it might be said that overall the service was not as good at it was 10 years ago.

The ambulance service was, in some respect, similar to the hospital service in so far as ambulances and hospital beds were both difficult to acquire. It took two years to obtain a new ambulance. It was the medical profession which controlled the user side of the service and some 93 per cent of the total authorisations for ambulance transport emanated from hospitals. Studies at one general infirmary during the past ten years revealed that whereas in 1957 one out-patient in 7·5 was transported by ambulance, the figure in 1967 was one in 11·6. This improvement was encouraging and indicated an increased awareness on the part of medical staff of the need for care in authorising ambulance transport. It was clear that consultation and co-operation were the key-notes of a more efficient service, and there appeared to be a most favourable situation in Scotland, where the service was under a single control.

DISCUSSION

Opening the discussion, **Mr. W. Sillar,** Consultant Orthopaedic Surgeon, Southern General Hospital, Glasgow, noted the need for clearer definition of the central and regional areas of responsibility. Again, the possibility of separating the accident ambulance service from the hospital transport service—an attractive proposition at first sight—required further examination. At the same time, arguments between the hospitals and the ambulance service could have the effect of delaying necessary developments, which included additional vehicles, the provision of improved types of splinting, and better radio communications.

It was noted that in accident wards a proportion of beds was retained as a reserve, and, similarly in the fire service, men and vehicles "stood by", yet this approach was not used in relation to the ambulance service, where resources became fully committed in covering both routine and emergency work. Mr. Sillar considered that it would be valuable for a co-ordinating officer to be "embedded" in the hospitals to effect closer liaison, and to make the hospital staff constantly aware of the need for their positive assistance in using the ambulance service to the best advantage.

In a lively discussion the following were the main points to emerge:—

1. **Regional or central control**

   It was generally considered that central administration was not incompatible with a suitable level of delegation. Conflicts of view between regional or central control were more apparent than real. Some degree of local control was important as it was accepted that problems of running an ambulance service varied widely in different areas. Central direction of overall policy, financial control and the increased possibility of bulk purchase, held many advantages.

2. **Division of the ambulance service**

   There was agreement that the main area of work for the ambulance service concerned accident and emergency patients, and in transporting those who were acutely ill. This specialised work could be distinguished and should receive priority over any routine "bus" function, but there were divergent views as to whether these elements should be divorced. Some separation on an operational basis, with the accident and emergency service staffed by the more experienced personnel, might be practicable, though it was necessary to retain a sufficient pool of vehicles for deployment in the event of a major emergency. It was important to avoid solutions which were too "rigid", but it might be possible within the ambit of the main service to allocate ambulance vehicles to, for example, day hospitals or out-patient departments to meet their particular requirements.

3. **Abuse of the service**

   Although the definition of "abuse" was not precise, there was general acceptance of the fact that many patients, who could use public transport or who might even be conveyed more economically by taxi, were transported by the ambulance service. The degree of "abuse", estimated at some 20 per cent of journeys, represented a serious problem to those providing the service and inevitably reflected on the most efficient deployment of available resources.

4. **Training**

   The recommendations contained in the working party report of 1967 were noted, and it was hoped that effective action would be taken soon to implement them. A proposal

that ambulance personnel should take the course for State enrolled nurses was made. Even if this were accepted, however, it would take two years and "crash" courses in resuscitation, etc., were recommended as a supplement to existing training. The present training of ambulance-men was described; this included first-aid, which was revalidated each three years and regular practical tuition. It appeared possible that further practical work might be arranged at existing accident centres.

5. **Oxygen, suction and splints**

It was noted that treatment should begin at the site of an accident, and that this required suitable equipment and the ability to use it correctly. It was expected that suction and oxygen would be provided in all ambulance vehicles by the end of 1968, and newer types of splint were on trial. The jet splint would be adopted if a clear medical recommendation was made; meantime, some differences of view appear to remain on its safety, even when inflated by mouth.

6. **Nursing escorts**

The prolonged absence from duty of nurses, both from hospitals and from local authority services when escorting patients to hospital, was raised and it was recognised that this posed difficult problems. These could be relieved by better communications and by ensuring that escorts were only used when patients required skilled attention en route.

7. **Radio control**

The value of direct radio contact between ambulances and hospitals, particularly in relation to accident services, was emphasised.

8. **Flying squads**

The value of a "flying squad" had been demonstrated in maternity work, and its possibility in dealing with accidents and possibly in coronary care was raised. A "squad" of this kind was particularly useful in accidents where a patient was trapped, but in other instances it had been found that transport by the routine ambulance service was, in fact, quicker.

9. **Awareness and responsibility**

Several speakers stressed the importance, particularly in relation to medical staff, of a full awareness of the implications of authorising ambulance transport. This could be assisted and co-ordination improved where an ambulance officer was located at a hospital, as many authorisations for hospital transport referred to patients undergoing physiotherapy. The possibility of delegating responsibility to senior physiotherapists had much to commend it.

10. **Finance**

It was stressed that the necessary finance to maintain and improve the ambulance service was part of the total allocation for the health services, and had therefore to take its place and be assessed in relation to other priorities. There were divided views as to whether a charge should be made to patients for transport to and from hospital for other than emergency reasons.

11. **Administrative action and further surveys**

It was emphasised that unless the authorisation for ambulance transport indicated, for other than emergency calls, that additional assistance or some particular facility was required, these would not be provided. The onus was therefore on the authorising officer to provide the necessary information in all cases.

Further survey work was necessary in relation to:—

(*a*) Communications and radio links.
(*b*) Sub-division of the elements of the ambulance service.
(*c*) Types of splint.
(*d*) The number of ambulance vehicles required for a given population size.
(*e*) The demands on the hospital service by general practitioners.

Further surveys of the type recently undertaken in Portsmouth (Brit. Med. J., 1968, 1, 369–372) were advocated.

February 1968

HOSPITAL HAZARDS

An understanding of any risk is essential to its prevention or control. There are many types of hazard to which hospital patients and staff may be exposed; many points relevant to these were made at this conference.

Mr. E. U. E. Elliott-Binns, Under-Secretary, Scottish Home and Health Department, took the Chair.

Dr. G. D. Forwell, Principal Medical Officer, Scottish Home and Health Department, introduced the subject and noted that doctors, nurses and other personnel worked in hospitals in accordance with the demands of the organisation and the standards of their professions. The general emphasis was, rightly, on the skillful application of modern therapeutic techniques. If hospitals were considered as units engaged in the production of health, patients might be compared with raw material, which had to be fashioned to approximately as closely as possible to the criteria of normality. They were processed through routine channels, stored in neat white beds, and were seldom expected to participate actively in the various nursing and medical techniques applied to them. Hospitalisation involved an abrupt change in the patient's activity pattern and social relationships. From one who communicated with others on a reciprocal level, he might be changed into a person who was talked to rather than with. Almost all the details of his life, including eating, elimination, position and living space were subject to the order and control of strangers. From his own room in his own home he may have to share a noisy barn as his and others' bedroom, sharing dining, toilet and washing facilities; he may be labelled and referred to as often by the nature of his affliction as by his name.

Almost one hundred years ago Sir James Simpson noted that to most professional minds it was a kind of medical heresy to doubt that hospitals could possibly be other than beneficial in their practical results. It was not difficult, however, to envisage various physical and emotional hazards, but there was a prevalent notion that the doctor who emphasised the dangers of hospital was like an apostate priest who denounced the Church. There was, nevertheless, a substantial recent literature on the subject. Of 140 references in Hospital Abstracts during the past six years, and excluding twenty papers dealing with hospital dangers in a general way, 65 per cent dealt with some hazard of infection; 17 per cent with burns, electricity and fire, 7 per cent with falls and the remainder with a miscellaneous assortment, including hazards incidental to anaesthesia and drug administration, radiation and blood transfusion. The Scottish Hospital Centre Library bibliography No. 10 gave a list of references to recent publications*.

Hazards to patients and staff could be classified in various ways. There were two main groups—infections and other-than-infections. Infections included both instances where the infection passed from one person to another—cross-infection—and the group where the infection passed from one tissue to another in the same person—self-infection. Other classifications could be applied, for example, hazards to patients and to staff; acute and chronic hazards; those foreseeable and unforseeable; staff blameless and staff negligent; hazards specific to medical institutions or otherwise.

While little published information was available about the completion of accident report forms in Scottish hospitals, these appeared to refer principally to falls. The majority of reported accidents to patients in one survey over a five-year period in a hospital group in England showed that 54 per cent of all the accidents occurred in the vicinity of the bed—falling out of bed, off a bedpan or off a chair. Only 14 per cent of the accidents were sufficiently serious, however, to require a doctor or order any treatment. The accident rate was higher for males than females, and for medical than surgical patients. Another survey indicated three main causes for falls in the hospitals—lack of supervision by staff, high beds and slippery floors. In general, cause and effect remained insufficiently recognised and related. Accidents were commonly regarded as due to causes which were somehow different from those that led to disease. They remained the only major source of morbidity and mortality viewed by many in irrational terms. "Luck", "chance", and "acts of God" were culturally acceptable explanations of accidents, although no longer so for disease.

Procedures for reporting and investigating accidents tended to over-emphasise individual occurrences and the possibility of litigation. They paid too little attention to prevention and the search for patterns in numbers and types of accident. With an epidemiological approach, hazards to patients and staff could be recognised not as isolated chance events, but simply those not premeditated. The emergence of epidemiological patterns rested on the concept of "host", "agent", and "environment". From these the chain of events which led from an unsafe act or condition to an injury might be identified. As the object or agent giving rise directly to an accident was often evident, e.g. a faulty floorboard, scalding water or the unguarded poison—the common tendency was to consider that factor only. As with infections, however, accident causation might require the view of more than one aspect.

Hospital staff were members of a complex organisation with both specialist clinical departments, supporting services and a substantial industrial element. The environment ranged from wards to laundries, operating theatres to kitchens, laboratories and pharmacies to workshops and from offices to residencies. An essential difference between health services and industry was its two-fold responsibility, i.e. to patients and staff. A mishap in an industrial process might result in injury to an employee and the right-off of an item damaged. A similar accident in hospital could result in two types of person being injured. The service had its own particular occupational hazards. The most prominent, perhaps, was the constant contact of most employees with sick or injured people. In addition to the risk of infection in wards, out-patient departments, laboratories and laundry, emotional stress was aroused in dealing with people who were sick and anxious.

In industrial medicine the three cardinal principles of accident prevention were the three "Es"—Educa-

* Copies available on request to The Librarian, Scottish Hospital Centre, Crewe Road South, Edinburgh, 4.

tion, Engineering and Enforcement. Education was given priority and, as in industry, safety in hospitals required an inter-disciplinary team to review potential accident causes. An organised accident prevention programme would eliminate many accidents. Reporting of injuries should be rationalised and regular tours of inspection made by members of a hospital safety committee. The aspects of engineering and enforcement could be assisted by good hospital design. For a prescribed regime to be carried out the design should not only permit it but make the right behaviour easy. Hospital staff should not be involved in a constant struggle with the physical environment.

New techniques, treatments and equipment inevitably brought new hazards. Ideally these should be anticipated; they should certainly be recognised and dealt with after the first accident occurred. In 1967 the Health Departments instituted an "early warning system" for reporting serious failures of medical supplies and equipment in hospital, which constituted an actual or potential danger to life or health of patients or staff. The Departments were responsible for the feedback of information to the hospital and other services. Since its inception, nineteen incidents had been reported to the Scottish Home and Health Department and eight early warning notices issued. These arrangements were not intended to relieve those involved in any incident from taking all possible steps to ensure that any faults were fully investigated and rectified.

Miss A. I. C. Bone, Matron, Ayr County Hospital, spoke from the nurses' point of view and noted that any review of the categories of nursing and other staff in hospitals showed the patient in the centre of an army of people, who had different types and levels of responsibility. If communications were not of a high order, the safety, welfare and comfort of patients could be endangered. These aspects took precedence in any definition of nursing. The approach to hospital hazards must be by a team, and it was necessary to work hard to ensure that communications passed accurately along the line and essential that all the relevant messages were in fact released.

Policy and practice required constant review in relation to many aspects susceptible to human error. These related to patients' records, drug prescribing and administration, identification bracelets, bed labels, laboratory requests, therapy charts, transport arrangements and after-care instructions. Well-designed forms were important and time was necessary to fill them accurately and have them checked. All too often documentation had to be undertaken "on the wing".

The Medical Defence Union, the Royal College of Nursing and the National Council of Nurses had defined various safeguards which, if they were followed, would minimise the risk of operation on the wrong patient, the wrong side or limb or digit. The memorandum issued in March 1966, should be carefully studied. With many medical and nursing staff from overseas, the hazard inherent in language difficulties should not be underestimated. Time and energy was directed daily in hospitals to clarification of communications and in helping patients to avoid misinterpretation or being misinterpreted.

Nurse staffing levels were relevant to the problem of safety. The stresses placed on many nurses were too great and the image of an overworked profession was frequently justified. Practical nursing procedures, whether in relation to basic or technical nursing, involved dangers to be recognised and avoided. Good powers of observation, developed in training, led to early recognition of hazards related to a wide range of points to which basic nursing applied. The design of hospital beds and cots was of particular importance. Suitable, variable platform height—taking into account the addition of thick interior sprung mattresses, easily handled cot-sides and suitable bed and cot stops were essential aspects of design. A good quality all-purpose bed and sufficient nursing space around each bed were definite aids to good nursing care and to safety.

The potential dangers, especially to elderly, disorientated, psychiatric, sub-normal or paediatric patients from eating, drinking, bathing, moving and eliminating were considerable and placed a heavy responsibility on the staff. Loose garments, sloppy footwear, slippery floors, lack of handrails and call-bells, of protection to windows, radiators and hot pipes, and poorly maintained equipment added to the problem. Most of these defects were preventable. Smoking in bed was a problem to which there seemed to be no easy answer. Regular smoking hours, ash trays, constant vigilance by nursing staff and a highly developed sense of smell could minimise the problem. There should always be an adequate alarm system in the event of fire and regular fire drill for the staff.

Technical nursing procedures were now extensive and carried the hazard of misidentification. Each hospital should have a nursing procedure book, and there should be a close integration of practice in both classroom and ward unit. It would be valuable in addition if a booklet explained the hospital's policy on the care and use of drugs and poisons. Duties might be assigned to nursing staff either temporarily, where there was a shortage of doctors, or permanently when some new technique became a more routine procedure. In many cases the nurse's education and training warranted this delegation, which brought additional interest to her work and tested her skill. It was important, however, that responsibilities should not be delegated where they were outwith the nurse's capability or when she had no time to undertake them. Where a nurse's duties were excessive or ill-defined, as in some out-patient departments, oversights could occur as, for example, leaving patients in undressing cubicles for prolonged periods; in a recent case up to 3.0 a.m.!

As regards cross infection, the essentials quoted by Florence Nightingale in 1859, remained relevant —pure air, pure water, sufficient drainage, cleanliness and light. In addition to environmental factors and well-designed accommodation, a high standard of nursing technique had an important part to play in minimising the spread of infection. Schools of nursing, supported by clearly defined policies, had a great contribution to make in stressing the prevention of this and other hospital hazards.

Dr. J. C. Gould, Director of the Central Microbiological Laboratories, Western General Hospital, Edinburgh, stressed that infection occurring in hospital remained an important hazard. It could be measured by the incidence of cases and, while the criteria used in recording were variable, the overall rate was unlikely to be under 20 per cent of all admis-

sions. Cross infection represented one facet of hospital infection and, while the total number of instances was large, the majority of infections were trivial and might even pass unnoticed. It was important to note that not only surgical wards were involved in this problem.

An epidemiological approach to the problem was necessary if methods of control were to be efficiently applied, and for this it is helpful to outline the sources and routes of infection under certain headings, though quite clearly any infection may involve more than one of these.

1. **Apparatus used**

   Points relating to the efficiency of sterilisation, the potential danger of respirators, humidifiers, and even of swimming baths, were noted in this connection. Well maintained efficient apparatus and a knowledge of its proper functioning represented an important part of the physical barrier to infection.

2. **Procedures employed**

   The inherent dangers in many types of procedure should be fully recognised. This applied to both complex and relatively simple procedures such as catheterisation, transfusion and laboratory investigations.

3. **Environmental factors**

   The patient's environment could be modified in various ways. Physical isolation from the main sources of human pathogens could be achieved and further protection obtained from chemical defences. The choice of antibiotics and antiseptics was important; the use of these substances must be carefully controlled in order that selection of resistant flora did not occur. Many antibiotic agents were now available and had played a part in the great reduction in mortality from infection which had occurred in recent years. An antibiotic policy for a hospital could help to prevent the development of resistance and reduce the total number of infections.

4. **The patient**

   The patient's normal physical defences may be breached by instruments or by transfusion. The over-enthusiastic use of antibiotics might destroy commensal organisms and, by upsetting natural flora, diminish the patient's defences. In some instances, e.g. transplant surgery, immunity may be lowered intentionally and additional care was then necessary to prevent infection.

In conclusion, Dr. Gould emphasised that the epidemiological approach to the study of hospital infection must be made in searching for causes, classifying infections, and studying sources and the modes of spread in any outbreak. This is best carried out by a flying squad of microbiologists available to study individual incidents and advise on their limitation and prevention.

Professor J. R. Greening, Head of the Medical Physics Department, Royal Infirmary of Edinburgh, referred to the wide variety of physical chemical hazards to patients and staff in hospitals and emphasised that the first essential of control was to be aware that a risk existed and to appreciate its nature. A considerable number of publications were available.

While it might be possible to design the hazard away or to control it, responsible supervision was frequently necessary and a large element of personal responsibility was involved. A careless, incompetent or inadequately qualified person was a hazard. There were dangers in accepting the lowest tenders for equipment; quality counted in this respect and in the calibre of staff employed.

X-rays and radio-active materials

It was noted that some 20 million X-ray examinations were carried out per annum in the United Kingdom, i.e. approximately four examinations for every ten people. About 3 per cent of all National Health Service staff were designated as radiation workers and perhaps 6 per cent in teaching hospitals. Possibly 10 per cent of all hospital staff have some radiation exposure. The effects of radiation were subtle and made news as they were related to conditions such as leukaemia and infertility. An extensive code of practice for the protection of persons against ionising radiation was in force and the need for the safe disposal of radio-active waste was well recognised.

Other radiations

Risks occurred in relation to ultra-violet radiation as in welding, physiotherapy and laboratory work. Suitable goggles were protective. Lasers used in the "spot welding" of detached retinae, irradiation of malignant tumours and gas analyses were only a small problem if used according to the code of practice. Microwaves and ultrasonic waves had certain limited applications in hospital practice and their risks were not extensive.

Electric shocks

With much specialised and electronic equipment in hospitals, there was a danger of shocks to both patients and staff. The different conventions in the United Kingdom and elsewhere in relation to the colour code for cables required careful checking and it was noted that an inaccurate reading might be as great a hazard to a patient as the faulty earthing of a piece of equipment.

Explosions

Electrical apparatus could ignite explosive mixtures of gases and special "flam proofing" and switches were required in certain situations. Sparks from static electricity could be dangerous if the prescribed anti-static precautions were not followed. Some fires could be explosive and attention was drawn to the hazards of high pressure oxygen used in hospitals. Again, many organic solvents in hospital laboratories were highly inflammable and had low flash points.

Machinery

Mechanical hazards occurred particularly in workshops, kitchens and laboratories where items such as saws, drills, slicing, dicing and chopping machines, pressure vessels, vacuum plants, centrifuges and gas cylinders were used.

Dust, vapours, gases and poisons

These require control in relation to workshops, building operations and the use of organic solvents. Many dangerous drugs were in use and many of the chemicals handled in laboratories were highly toxic. In addition to the importance of recognising that a danger existed, aspects of design were important, for example, of fume cupboards. Staff using items of these categories should be conversant with the relevant literature in connection with their handling and disposal.

In conclusion, Professor Greening suggested that the hospital service might welcome unofficial visits from H.M. Inspectors of Factories. The anticipation of inspection had a wonderfully concentrating effect on the mind!

Mr. A. F. Neilson, Legal Adviser and Solicitor, Central Legal Office, Edinburgh, explained the position of the Central Legal Office as part of the Scottish Hospital Service. He distinguished between two types of hazard in hospital life namely those inherent to a medical procedure which might cause injury to a patient without involving any negligence, and those arising from negligence to many of which could be applied the adage that prevention is not only possible but is better than the cure. Negligence had been judicially described as "such a neglect of the interest of others as a man of conscientious mind would not allow if his own family were concerned". To justify any legal claim it had to be established that a duty of care existed; that there had been a failure to comply with this duty and that injury had arisen as a result of the failure to the party to whom duty was owed. As a standard it had been judicially laid down that "the true test for establishing negligence in diagnosis and treatment on the part of a doctor is whether he is proved to be guilty of such failure as no doctor of ordinary skill would be guilty of if acting with ordinary care".

Against that background he agreed in principle with the aims of Education, Engineering and Enforcement referred to by the earlier speakers, provided this resulted in a development of the right attitude in the staff mainly at risk.

Awareness of a hazard was important. Prevention required not only the performance of studies and the application of results, but effective communication to the staff concerned. The excellent codes referred to by Professor Greening had been produced after careful study and thought, but nevertheless incidents still occurred which could have been prevented by conformity with the recommendations in these codes. As against the negative fatalistic attitude that trouble was inevitable, the positive approach towards prevention required that senior staff in each unit should determine from time to time the potential hazards, if any; they should consider whether a system of work could be devised to avoid such hazards or minimise their effect. If such a system of working could be devised, it should be written and made available to all staff as part of their instruction so that those who may be involved with it understood the system, why it had been introduced and be required to conform to it. Senior staff had a particular responsibility in communication with other staff, especially concerning innovations and the applications of new techniques.

Experience had shown that many incidents could be traced to a preventable defect and that failures in communication had frequently played a part. Even where signatures were obtained from staff to indicate that they had read circulated instructions, it was important that memories should be refreshed from time to time. If a preventive system of work was not worth a serious effort to ensure that it was being strictly followed, it should be scrapped.

Many practical recommendations were available in National publications, in connection, for example, with the handling of dangerous drugs and the prevention of danger from radiation: others could be made at group or hospital level. It was essential that hospital staff recognised the degree of interdependence which existed between different units and different professions and how a mistake in one sphere or an error of communication might affect others. In connection with the latter, the language barrier was important. Misunderstandings had resulted in serious consequences. Where there were inherent risks, verbal instructions should be confirmed by simple question and answer and, wherever it was practicable to do so, they should be supported by a written record.

Property and equipment should be subject to regular inspection and the expeditious repair of any defects which could give rise to injury. Regular maintenance of equipment was most important, and suitable records should be kept and might be of value in any subsequent legal proceedings. Even where there was a system of regular inspection for defects, it was important that if faults were noticed by members of the staff using units between inspections, they should be encouraged to report and have a clear channel of communication for this purpose.

Dr. J. W. Brooke Barnett, Deputy Secretary, Medical Defence Union, London, introduced the film "Make no mistake". This film outlined various pre-operative and operative safeguards against human error and emphasised, in addition to the patient's identity, the handling of swabs, instruments, gases, etc. and the need for meticulous attention to detail.

DISCUSSION

In the discussion which followed, the following were the main points to emerge:—

1. **Hospital beds and sedation**

   Varying experience in connection with patients falling out of bed was described. Where this happened frequently, fixed-height beds with thick interior sprung mattresses and over-sedation, particularly of elderly patients, were regarded as important contributing factors. Where variable height beds were available and used, the problem was greatly reduced. The routine and almost "on demand" use of sedatives was deplored, its perpetuation might result from a lack of clear communication between doctor and nurse.

2. **Training, communications and awareness**

   These aspects were recognised as essential and related elements in creating situations in which accident prevention could be effective. The reduction of many types of hazard depended largely on the recognition by staff that a danger existed and on an appreciation of its nature and the correct preventive action.

Communication which was restricted to notices, pamphlets and edicts was seldom effective. Time had to be set aside for discussion and explanation. The application of an effective feedback required a positive effort.

3. **Stock control**

The danger inherent in over-stocking drugs at ward level was raised. Recent survey work had shown ranges of items far in excess of current ward requirements. In one instance a student nurse had to select twelve items from over 400 in a cupboard. Closer links between pharmacists and ward units should be encouraged and might lead to better stock management. In some areas, particularly where a group pharmacy served several hospitals, the staff available made effective liaison difficult. This, however, should not preclude the possibility of action in reducing accumulated drug stocks at ward units.

4. **Cleaning**

The value of "resting" and thoroughly cleaning ward units as a corrective against the build-up of infection was suggested though administrative difficulties in isolating one unit from another and in reducing overall occupancy rates in the face of pressure for admission were recognised. In some cases the evacuation of a ward unit was necessary.

The need to provide easily cleaned surfaces and accommodation to suit the requirements of modern domestic services was essential to satisfactory cleaning. The greater attention being paid to this in plans following the guidance in the Scottish Home and Health Department's Planning Note "Ward Design" (1963), was welcomed.

5. **An occupational health service**

The need for a service of this kind to protect hospital staff was raised. An "occupational health officer" might represent a broader concept than a "safety officer" and extend the type of supervsion and protection now applied to staff exposed to ionising radiations and to other categories including, for example, those handling dangerous chemicals. An occupational health officer might be responsible to a safety committee. Others considered that a single officer would have a limited effect throughout the whole hospital. It was important in some departments for a senior person to have the duty of watching over the use of techniques and correcting faulty procedures where necessary.

6. **Handbook and circulated data**

The possibility of preparing and circulating to heads of departments a regular bulletin analogous to reports on communicable diseases was suggested. To be effective these would require to be detailed and informative; they might lead to a disproportionate burden of preparatory work.

It was noted that a series of handbooks on aspects of safety in relation to ward units, administrative areas, domestic service and technical departments was being prepared under the auspices of the King's Fund. The first in this series was in an advanced stage of preparation. There was also scope for suitable leaflets on specific points and for appropriate safety posters.

7. **Committees**

In general it appeared that control of infection committees were inactive and the procedure for dealing with accident reports at hospitals and Boards of Management was variable. There might be a case for a Board of Management Committee consisting mainly of officers and consultants meeting quarterly to review reports and assuming a more epidemiological approach to consider preventive action. It was noted, however, that the existing committee work at Board of Management level was heavy and that the more committees and sub-committees there were, the less effective each might be.

8. **Responsibility of technicians**

The increase in laboratory work implied greater responsibility on senior officers to ensure that the reading of results and the provision of information to ward and treatment units was undertaken only by staff of suitable seniority.

9. **Planned preventive maintenance**

Experience of planned preventive maintenance had shown many areas of serious neglect. Had the maintenance programme not been instituted, these defects would have remained until a breakdown occurred. For new equipment it was essential to ensure that the item selected was in fact suitable for the function it was intended to perform and appreciation of different colour codings was important. It was considered that in the engineering field a clearer definition of areas of responsibility was necessary; it was too easy to designate a single person and assume that he could discharge an unspecified area of responsibility.

10. **Early warning system**

It was emphasised that the early warning system was not a substitute for local action where this was necessary. It was also stressed that if there was any doubt as to the need to report any particular occurrence, the Scottish Home and Health Department should be approached for advice.

March 1968.

THE PLACE OF THE SMALL HOSPITAL

Any discussion of the future role of small hospitals raises sincerely held but conflicting views. The number of small hospitals in Scotland, their types, virtues and the problems involved in the use of scarce resources were reviewed and debated.

Mr. J. K. Johnston, Secretary of the Eastern Regional Hospital Board took the Chair.

Mr. J. Leithead, Chief Executive Officer, Research and Intelligence Unit, Scottish Home and Health Department, and formerly Secretary of the Scottish Hospital Centre, outlined eight categories of hospital identified by Senior Administrative Medical Officers of the Scottish Regions in 1963, and which might be said to cover "the small hospital". In these categories there were 135 hospitals varying in size from three to 95 beds. They represented a total of some 4,500 beds, slightly over one-eighth of the total number of beds in Scottish hospitals other than psychiatric units. These groups contained a fairly large number of hospitals but a relatively small number of hospital beds. They employed just over 2,700 nurses giving a nurse/staffed bed ratio of 1 to 1·6; this compared with 1 to 1·3 for all general hospital beds.

The categories were:—

1. Small general hospitals with some specialist staff: surgery undertaken, but no midwifery.
2. As for 1, with midwifery undertaken.
3. General practitioner cottage hospitals. Surgery undertaken either by G.P.s or visiting consultants. No midwifery. Consultant out-patient clinics held.
4. As for 3, with midwifery undertaken.
5. General practitioner cottage hospitals with midwifery undertaken. No surgery done: consultant out-patient clinics held.
6. General practitioner hospitals with some long-stay patients. No maternity or surgical work undertaken.
7. Small long-stay units with a low turnover of patients. No assessment units included: staffed by general practitioners.
8. General practitioner units undertaking normal midwifery only. Visiting consultants on request.

The location of small hospitals followed no defined pattern within the Regions. The Scottish Hospital Survey of 1946 noted that they had certain defects; they varied in efficiency and in the completeness of their equipment. Supported by independent voluntary and semi-philanthropic agencies, they had grown up to meet a locally recognised need. Some occupied modified dwelling houses; others had been purpose-built as hospitals.

The small hospital had given rise to considerable controversy in recent years and their existence involved a balance sheet on which cost was one among several entries. For the types of hospital under review, the costs ranged from £11. 6s. 1d. per patient per week in a small long-stay geriatric unit to £130. 8s. 9d. at one general practitioner maternity hospital.

Using slides to illustrate the appearance and physical characteristics of some ten hospitals representing the categories described, Mr Leithead discussed their main features and in particular, occupancy rates, staffing, the existence or otherwise of consultant cover, radiological, laboratory and physiotherapy services. It was noted that at some of these hospitals plans were on foot or had been developed to link a health centre with the hospital. Wide differences were evident. It was significant that a relatively new hospital was rapidly developing a long-stay character; another, in spite of empty beds at a hospital nearby, was overcrowded with "acute" patients.

In the Hospital Plan for Scotland*, published in 1962, the general hospital provision for many areas outside main cities was recognised to have been inadequate, and that part of the service had been met by a series of small cottage hospitals designed for treatment and care of a different nature from that now required. These "cottage" and other small hospitals reflected conditions of transport before the internal combustion engine and their continuing usefulness would require review as major new projects were completed. In outlying areas—which could be interpreted as the islands round our coasts there was no practicable alternative to the small acute general hospital, but the Plan noted that elsewhere the small hospital could no longer be regarded as an efficient means of providing for specialist work.

In conclusion it was stressed that in considering small hospitals, many factors were involved including size, distance, staffing, the range of clinical work to be undertaken, diagnostic equipment required, links with general practitioner work and with local authority services. Some small communities had hospitals of this kind, while more populated areas equally remote from specialist units, had not. It seemed that those who had a small hospital could not do without it: those who never had one did not miss it too much.

Dr. C. J. Swanson, General Practitioner, Aberfeldy, Perthshire, began by declaring his interest, or bias. In over 40 years of general practice he had always had a cottage hospital available. He agreed with Sir Henry Burdett, who wrote in 1896, "Personally, I simply would not continue to practice without the cottage hospital. I can imagine nothing more miserable for a man who is fond of his profession than to see all the bad cases taken away from his care to be treated at a distance". With a tendency for more and more specialism in the new district general hospitals, these words appeared to have even greater significance. There was a variety of medical episodes which made no demands on specialist attention, but which required skilled nursing and primary medical care. In some areas these must perforce add to the congestion of the waiting lists and be admitted to specialist hospitals, although they would be better accommodated in the small general practitioner unit or cottage hospital.

From the patient's point of view, the advantages of the small hospital, especially in rural and semi-rural areas, were obvious. The patient's welfare should be paramount although, nowadays, he was apt to be lost in a plethora of technical and scientific

* Department of Health for Scotland. Hospital Plan for Scotland. Edinburgh, H.M.S.O., 1962 (Cmnd. 1602).

efficiency and research. There was an element of psychological trauma in being removed from home. This applied especially to elderly people, who were less upset if the move were simply "round the corner" to a small friendly general practitioner unit within easy reach of their friends and where they could keep in touch with local events. The position was different on admission to a distant, impersonal, functional palace of steel, glass and concrete.

There were also advantages from the general practitioner's point of view and particularly for practitioners taught in larger hospitals by those with no knowledge of domiciliary practice. There were young doctors who had acquired skills they would have no opportunity to exercise, mainly through lack of the necessary facilities and equipment—trained clinicians denied the chance of doing much more for their patients than was well within their competence. It was little wonder that there was no great enthusiasm to enter general practice, and that many young men having entered practice, became dissatisfied, pulled up their roots and sought wider spheres of responsibility and interest overseas.

Job specification in small hospitals was well nigh impossible; the range of work varied according to the needs of the population and the interests, skills and expertise of the practitioners. This flexibility of purpose was one of the most exciting possibilities in a small hospital. It might range from gastric analysis to the cure of ingrowing toe-nails, from the general supervision of a convalescent to electrocardiography. It was essential that the small hospital had the closest links with the district general hospital. Specialists should visit to give advice when requested, or admit to their own units those patients who require specialist investigation and care. Specialist clinics, particularly in rural areas, were of immense value to consultant, practitioner and patient alike. Preliminary investigations might be done in a cottage hospital before the patient was admitted to a specialist unit and, later, convalescence might be completed at the small hospital before returning home. This type of integration and its possibilities was well illustrated when a small hospital had a few maternity beds or in casualty work, where minor accidents could be efficiently dealt with under suitable conditions and patients with major injuries despatched to the appropriate hospital after simple but possibly life-saving measures.

In reply to the frequent question, "How can these hospitals be staffed with nurses?", the answer was four-fold.

1. A well-trained matron and a sister to relieve her are a sine qua non.
2. Much help could be got, at least in country districts, from the employment on a part-time basis of married nurses willing to give a few hours a day to nursing duties.
3. Despite objections from senior members of the nursing profession, girls of 15½–16 years of age on leaving school might be encouraged to begin probationer duties in small hospitals. If they proved their worth, they would be sent when 17½ to a training school. If such girls were not attracted into nursing, they would drift into shops and offices and be lost to the nursing profession.
4. There appeared to be no good reason why integration with the district general hospital should not extend to the nursing staff, with a period of secondment. This would confer advantages to nurses in training as well as to the small hospital.

Most cottage hospitals were built many years before being taken over under the N.H.S. Act in 1948. Many were provided by public spirited benefaction and maintained largely by contributions from the local community. A source of great local interest and pride, any suggestion of closure was always met with a public outcry. Since the inception of the Health Service, with the exception of the hospital at Portree in Skye, none has been built. Developments at Stranraer, Huntly and Langholm were more in the nature of health centre additions to existing hospitals.

It was difficult to understand why, if small hospitals were essential to general practice in country districts, similar facilities were denied to those engaged in urban practice. In 1952 a special report, "The General Practitioner and the Hospital Service"*, prepared for the Scottish Health Services Council, noted the objective of providing the general practitioner in urban and industrial areas with those facilities which many country doctors had in a local cottage hospital. Since then a few general practitioner beds had been allocated, but in insignificant numbers, rather grudgingly given and supernumerary to requirements. This was the wrong approach. In planning bed requirements, note should be taken of the large number of patients occupying specialist beds unnecessarily. These had been estimated at 30–40 per cent in the case of medical units, with a smaller percentage in surgical wards. Provision for these might be made in two or three strategically placed small hospitals in a city closely and functionally integrated with the specialist hospital. These "neighbourhood" hospitals were regarded as eminently practical in a paper in 1953†. There was, however, no suggestion of this in the Hospital Plan for Scotland or in its amendments. The corresponding Plan for England recommended the almost complete abolition of the small general practitioner hospital.

In the Eastern Region, the "regional plan" devoted nearly a chapter to "cottage hospitals" and stated that there will continue to be a need for those staffed by general practitioners. The Board considered that such hospitals could become the focal point of the local health services for the community. If this were true for country areas, why should the same reasoning not apply in the cities? The concept of the small general practitioner hospital was the basic theme of the Dawson Report on a Health Service for a Nation‡, published in 1920. It envisaged Primary Health Centres strategically placed around a secondary centre—or, as it would now be called, "a district general hospital". After nearly 50 years, the dusty pigeon holes had emitted a hopeful ray

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* Department of Health for Scotland. Scottish Health Services Council. The General Practitioner and the Hospital Service. Edinburgh, H.M.S.O. 1952.

† Hamilton, J. G. M. General Practice and the Hospital. British Medical Journal, 1953, September 26, 711-714.

‡ Interim Report on the Future Provision of Medical and Allied Services. Chairman: Lord Dawson, London, H.M.S.O., 1920.

of light: the recently published report of the Royal Commission on Medical Education (Chapter 11, para. 41), states in relation to health centres with teams of 12 or more practitioners, "we expect that centres will have in-patient accommodation for short-stay cases, and possibly facilities for minor surgery".

Dr. Swanson noted that it cost today about £8,500 per bed to build a district general hospital, excluding equipment. He considered that including equipment for the highly sophisticated units for intensive care, now considered essential, the figure became staggering. He felt sure that, bed for bed, small general practitioner hospitals could be provided at a much lower figure. They might replace about one-third of the specialist beds and if these assumptions were true, and the units built, they would represent a real economy. The small urban hospital would not be an isolated unit in relation to catering and supplies, and the bed occupancy rates, which were no doubt comparatively low in some rural areas, would be high. In the final analysis, however, the question could not be evaluated in terms of money and productivity, but rather on the use of available resources for the greatest benefit of the community in the alleviation of sickness and suffering. In this the small general practitioner hospital had a great part to play. Reorganisation of hospital work and of general practice were interdependent. By maintaining cottage hospitals and extending them into the great conurbations, a step would be taken towards achieving this re-organisation; closer integration of the profession would provide a better service to the community.

The Rev. J. W. Cumming, Ex-Chairman, Board of Management for Nairn Hospitals, regarded his contribution as that of an outsider gazing into the hospital without fully understanding what the medical and nursing professions were about. At the same time he had been connected with large medical units in Scotland, Egypt and the Argentine, and with small ones in Arbroath, Orkney and Nairn. Having been a Board of Management Chairman for three years, he confessed a romantic admiration for the small hospital. His respect for them had grown by leaps and bounds and he considered that their place could be eulogised in relation to the hospital service itself, patient welfare and in community development.

It was possible that the hospital of 25 beds which he had particularly in mind would be closed at some future date as an uneconomic unit. An efficient ambulance service would transport all hospital patients fifteen miles to the new district general hospital. The Regional Board would record a saving in expenditure and officials would be able to cut down travelling and administrative time. It had recently been stated in official circles that in modern education there was no place for the small school. If this was the situation in hospital circles, many officials and practitioners would have sore hearts as they found in the small hospital a personal interest in the individual patient and a bond of compassion which, while present in larger units, was more difficult to focus with so massive and complex a team. Small hospitals may be regarded by some as a costly nuisance but, particularly in the north, owing to geographical factors, they were a necessary part of the hospital service.

The ideal hospital had been defined as one where love and understanding most abound, but Regional Boards administering larger and larger hospitals were in danger of de-personalising medical services and making more and more patients feel like guinea pigs in a laboratory or mechanical spare parts in a garage. The trend was a peril in the whole of present-day society, but was focused and felt most keenly in the hospital ward. There was no reason why agreeable relationships could not continue between board officials, administrators and the small hospital: their interest was of immense value to patients and staff in the hospitals and they, too, gained from this association.

The closure of any small hospital invariably aroused angry opposition from the community it served. This was not just native resentment against officialdom or small-town hatred of change, nor was it only a blind clinging to communal self-preservation. These factors might play a part, but from many years' experience with small-town congregations, there was no doubt that the presence of a hospital in a community gave citizens a real sense of well-being, security and completeness. The majority of human beings were lonely and, because of this, unreasonable. They were afraid of having to go into hospital, but if it was just "down the road" with their own doctor looking in to see them and if the matron was well known, that fear was halved. If the hospital was at a distance, and the patient did not know anyone who worked there and could only think of it as a monstrous building behind a high wall with queer smells and unknown, sometimes masked people, the fear and emotional upset was doubled if not trebled. The patient had not only to leave his home, but his own town, and assurances about better treatment in a bigger hospital did not help much. The psychology of location in medical treatment might well repay further study. It might show how vital was the small hospital to the welfare of patients, particularly in relation to geriatric work. Elderly people wished to preserve contacts with their friends too old to travel out of town. In the same way, locally placed maternity units could keep the mother in constant reassuring touch with the family at home and prevent the brooding loneliness which might create post-natal breakdown. A child in a local hospital could be visited by school class-mates, be tutored by his own teacher and would doubtless know some of the ward staff. In the small hospital, staff and patients might be inter-related and a beneficial camaraderie could and often did result. Staffing problems could be eased and local knowledge applied to personnel selection.

Sociologists as well as the Ministry of Defence were concerned to preserve small-town communities. Their disappearance could endanger our society. In this century many of our villages had lost their schools and their church. Some were now or might soon be in danger of losing their hospitals. Families tended to live where medical services were to hand, otherwise the population drift to the cities would be accelerated and community development in rural areas could become a bitter myth. Towns of five to ten thousand inhabitants needed a small hospital, and it might yet become the hub of developing communities as once the parish kirk used to be. A modern 50-bed hospital in which every practitioner had his surgery with an open ward for the mentally

ill, accommodation for dentists, opticians, chiropodists and chemists, might not be an unpractical dream. Close liaison between school and hospital could foster sound attitudes to health and disease in the minds of growing citizens. In a united Christian parish church, clerics and members alike might learn and practise new compassions where no truth was feared and no individual conscience violated.

Dr. J. Laurie, Consultant Physician, Dumfries and Galloway Royal Infirmary, spoke primarily from the standpoint of a consultant, though one who, as a founder member of a Board of Management and a member of the Western Regional Hospital Board, had extensive experience of the "management" problem. He suggested that for the purpose of discussion "small" hospitals might be restricted to units of under 50 beds. "Acute" and most special hospitals of between 50 and 100 beds were major units and, although within a narrower range, posed similar problems to district general hospitals: there were, incidentally, only three "acute" hospitals of 50–100 beds in the whole of the Western Region. It was also convenient to consider units of up to 50 beds as the Board's costing returns made a distinction at this level. Again "acute" hospitals of under 50 beds presented particular problems. Whatever their needs, their character and location made adequate consultant cover at best unreliable, at worst impossible and almost always uneconomical.

Dr. Laurie noted that in the Western Region there were 37 Boards of Management and 174 hospitals. These included 110 general hospitals (acute, convalescent, long-stay/chronic) with 18,955 beds, and 64 special hospitals (maternity, orthopaedic, paediatric, psychiatric, chest medicine, etc.) with 17,251 beds. Of the general hospitals, 22 acute (528 beds), 7 part-acute (156 beds), 4 convalescent (133 beds), and 11 long-stay/chronic (365 beds) were of under 50 beds in size. Of the special hospitals, 23 (703 beds) were also in this category. This meant that small "general" hospitals comprised 40 per cent of the total number of hospitals, but provided only 6·3 per cent of available beds. Including the small special hospitals, those under 50 beds accounted for 38·6 per cent of the number of hospitals in the Region, but only 5·2 per cent of the total number of available beds.

Consultant cover for small hospitals was not simply a matter of numbers of beds but their location. Long distances could be involved. For the Region the total number of consultant sessions for both general and special "small" hospitals was approximately 200 per month. This represented a very small proportion and was only the equivalent of about five whole-time consultants. In Dumfries and Galloway, where the Board of Management area contained more small hospitals than elsewhere in the Region, there were 12 "general" hospitals (569 beds) and 3 "special" hospitals (268 beds). Of these only one "special" hospital, an 18-bed maternity unit, was under 100 beds, and there were 10 "general" hospitals of under 50 beds. This latter group comprised 3 "acute" hospitals (52 beds), 4 part-acute (98 beds) and 3 long-stay/chronic (104 beds). This meant that of the total general hospital provision 83·3 per cent was in hospitals of under 50 beds and these provided 44·6 per cent of the general beds available. Including the small special hospital the proportions were 73·3 per cent of the hospitals giving 32·4 per cent of the total number of general and special beds. These figures indicated that in Galloway the "small" hospital contributed a much higher proportion to both numbers of hospitals and numbers of beds than elsewhere in the Region. The consultant cover at units of under 50 beds was also proportionately higher with some 50 general and 20 special sessions per month. This increase was due to better accessibility and to the amount of available accommodation vested in small units. It was not due to enthusiasm for this particular pattern of specialist work.

When the new 400 bedded district general hospital was built at Dumfries and the existing infirmary adapted to form a 150 bedded geriatric unit, this would allow the closure of four makeshift long-stay units which had outlived their usefulness, but even if it was desirable, it would not be possible to indulge in the wholesale closure of other small hospitals. These afforded almost half the general hospital accommodation in the area, and might be the only source of institutional treatment for many miles. At the same time the scope of in-patient consultant services to rural areas was limited. The intimacy and continuity of consultant care varied inversely as the distance between the central and peripheral units. Assuming that consultant time was available, the range of out-patient consultative clinics based on small hospitals might be wider. The main restriction to an increased service was probably the easy availability of specialist radiology. For convalescent and pre-discharge patients or selected chronic sick, there was still room for the care of patients at small peripheral hospitals arranged ad hoc between consultant and general practitioners on a "neighbourhood" basis.

The balance between general practitioner beds and beds for the chronic sick was not always easy to define, but there was no doubt that short-stay beds for general practitioners' use increased the scope of their work and could relieve pressure on specialist beds. Where health centres were being developed it was important that these should be placed as close to the hospital as possible. This would allow greater integration of health services, medical education and the development of community medicine.

On many counts, Dr. Laurie considered that the day of the selected small hospital was far from done. Their pattern of use required re-examination, but if any were to be closed, however economically unviable, local public reaction was to be expected. Their replacement would have to be based on a patently better service, strategically linked to district hospitals perhaps by motorways and/or helicopters. Meantime, most were likely to continue to constitute an important element in the hospital service.

Professor S. L. Morrison, Department of Public Health and Social Medicine, Edinburgh University, assumed that the needs of sparsely populated areas would continue to require special arrangements in which small hospitals played a part; there remained, however, the question of the place of the small hospital in larger towns and cities where most of the population lived.

The Hospital Plans for both Scotland and England were based essentially on the concept of the district general hospital. These hospitals would bring together a wide range of facilities for diagnosis and treatment and meet the trend towards greater interdependence of the various branches of medicine.

They would vary in size but would rarely be less than about 300 beds. They would be located in or near the centre of one of the centres of population of the area served, and would offer the most practicable method of placing the full range of hospital facilities at the disposal of the patients. This would outweigh the disadvantage of longer travel for some patients and their visitors. As regards small hospitals, it was noted that many would still be required. Some would be retained as maternity units, though additional provision would nearly always be at the district general hospitals. Others would provide long-stay geriatric units; some in special circumstances would continue to admit medical emergencies not requiring specialist facilities. Some might be retained in relation to out-patient services.

Looked at purely from the point of view of an authority required to organise an effective hospital scheme, the changes implicit in the Hospital Plans were logical and possibly economical, though the disadvantages of longer travel for patients and visitors might have been too lightly set aside. The ill-effects of separating elements of the health service were widely recognised. The Hospital Plan and its implementation illustrated one evil of the tripartite system—the administration of one aspect of the health service as an end in itself and consequently with little or no real consideration for the effects of actions on other essential parts of the service. With the assumption that the hospital service was a referral or second-line service, its development had endangered the existence of the primary medical care on which it depended. In the last 20 years the insatiable demands by hospitals for junior medical staff have created havoc with the career structure in medicine. Further separation of hospital medicine from primary medical care, despite lip service to general practice, could only create increasing difficulties in finding young doctors to practice medicine outside hospitals.

The Royal Commission on Medical Education* discussed the pattern of future medical care in Britain and the report accepts the district general hospital concept without question. It goes on to say, however, that they will not provide primary medical care, and that the steady movement towards larger and fewer hospitals pointed the need for an effective service of general medicine nearer to the patient's home. This would be given by group practices of about 12 doctors working from well-equipped health centres. The Commission's description of a typical health centre as a unit fully equipped for routine diagnostic tests, directly linked to a computerised screening centre, accommodating personal health services provided by local authorities and, except where located at a major hospital, with in-patient accommodation for short-stay cases and facilities for minor surgery, was almost precisely a dictionary definition of a "small hospital". It brought the place of the small hospital into clearer perspective.

In a recent paper in the Lancet†, it was argued that the centralisation of a facility may in fact encourage de-centralisation of input and sometimes of processing. It had only slowly been realised that the kind of work and environment could be decided before technological research was commissioned to allow these goals to be achieved. Transport and communication developments for health services were vital but neglected subjects. It was possible that the development of X-ray facilities and the transmission of radiographs by television could give general practitioners a first-rate radiological service. Meanwhile, even with existing technology, co-ordinated de-centralisation of some medical services would improve the quality of care. A single district hospital might be replaced by several inter-linked units, and these would provide the general practitioner with improved equipment and more effective association with specialists. The specialist, in turn, would be brought into closer contact with the community. The amount of travelling involved could be over-stressed and expanded community care might reduce the work of in-patient units.

Dr. Draper's "community care units" were in fact small hospitals. His thesis and the definitions by the Royal Commission might be extended to an organisation providing high quality medical care, both primary and secondary, and which might form at the same time an attractive field of work for doctors, nurses and ancillary staff. Specialisation within the field of primary care could be encouraged, and suitably trained practitioners should be capable of diagnosing and treating a high proportion of their patients whether they happen to be vertical or horizontal, whether at home or in a hospital bed. It would not be impossible to develop guide-lines for the division between primary and secondary care, particularly if specialists were in close touch with community care units. Thus, the health centre or community care unit could become a real "small hospital"; a base for primary medical care of a community of 25,000–50,000 people, backed by a highly specialised district hospital. The "small hospital" might thus have a vital future in the health service, and if this were accepted there might be a need to re-think the present concept of the district general hospital. Rather than dismantle those existing small hospitals, which were fulfilling a function of the type foreseen for the future, they should be used to test new ideas. Studies into integrated care should be undertaken as a matter of urgency.

DISCUSSION

Mr. A. L. Rennie, Assistant Secretary, Scottish Home and Health Department, opened the discussion. He stressed the clear and positive duty to use the resources of the health service to the best advantage and that this would inevitably require continued examination of the roles of both large and small hospitals. Where it proved necessary, these should be modified. It was important to keep the hospital service as small as possible, consistent with good treatment to patients; by itself, supplying board and lodging was not a suitable hospital objective. The virtues of small hospitals could be extolled, but substantial differences in their usage and cost could also be demonstrated. While it was clear that the day of the selected small unit was by no means over, it would be important to examine the work and the potential of each hospital individually in relation to the developing pattern of medical service for any area, rural or urban.

In planning hospital services many aspects had to

* Royal Commission on Medical Education. Report, 1965–68. London, H.M.S.O., 1968 (Cmnd. 3569).

† Community-care Units and In-patient Units as Alternatives to the District General Hospital. Lancet, London, 1967, December 30, Vol. II, pp. 1406–1409.

be considered as ideas developed and new slants emerged. It was not only in relation to small country hospitals that a special affection developed in the community. However irrational the arguments in favour of retention, all kinds of closure were bitterly opposed. In defining what the hospital service was expected to do, it might be necessary to re-draw the interface between general practice and hospital service. In this, an unthinking defence of all small hospitals would be wasteful in the light of limited resources of manpower and money. The continuance of under-used units would in fact deny care to some patients. The cost of building continually increased and recent experience had shown that the capital cost per bed for a small unit was as great as for a district general hospital.

In discussion, the following were the main points to emerge:—

1. **Classification**

   While descriptive classifications were commonly used and were valuable, small hospitals could be divided into two main categories—those which "sparked", and those which did not, i.e. those which were "alive" and those which were "dead". The reasons for this type of difference required evaluation and presented an important field for further study and experiment.

2. **Mini-medical centres**

   As units from which medical care would be delivered, effective centres might comprise a cottage hospital and health centre in association. Developments of this kind had been outlined in the 1966 Review of the Hospital Plan for Scotland. In such centres it was vital to define the ground rules. These must be conducive to an effective, shared enterprise in which general practitioners and specialists met and which would develop on a basis of enthusiasm and high staff morale. If the beds were to form an essential element of a general practitioner's work, it was wrong for them to be used for patients from other areas or for long-stay geriatric requirements. If pre-empted by specialists, general practitioners lost control of their use.

3. **Nurse-staffing**

   There was general agreement that the interest and personality of the matron was of vital importance in the small hospital. The presence of enrolled nurse-training facilities was of great value in maintaining nursing staff levels. This might be more easily possible where hospitals are grouped for training purposes. There was a clear division of view on the suitability of recruiting girls for pre-nursing training. On the one hand it was suggested that girls interested in a nursing career could be given a suitable range of work in a small hospital, and that they would otherwise be lost to the nursing profession. On the other hand, it was maintained that the type of work they could do might well be of an essentially non-nursing nature, their supervision was difficult and, in fact, they might add to the work of the trained staff.

4. **Consultant cover and general practitioner specialism**

   While the value of consultants' time could be overstressed, it was noted that the distribution of specialist skills at small hospitals raised difficulties. The fact that the younger doctor entering general practice had had more hospital experience than in the past was noted as relevant to the use of small hospital beds. If used only as an extension of home care, this had other connotations than attempting to run the unit as a modern acute hospital. If the latter was envisaged, either specialist clinics, etc. would have to be more frequent — and this would be uneconomic — or individual practitioners forming part of a group would require to develop some degree of specialism, e.g. in radiology and in anaesthetics. In this connection, however, the danger of quasi-specialism was stressed.

5. **Moving patients**

   Several speakers stressed the disadvantage of moving patients, particularly the elderly, to units remote from their homes. Experience was given from one small hospital which indicated that even with limited X-ray and other resources available, transfer of "acute" patients to the district general hospital was infrequent. Patients were more often moved from the district hospital to the cottage hospital for convalescence.

6. **Staff attitudes**

   While not disputing that staff attitudes in large hospitals could be impersonal and that this was to be deplored, it was maintained that any assumption that "tender loving care" was a prerogative of the small hospital was "a sentimental distortion".

7. **Re-distribution of beds**

   Several speakers indicated that additional beds would not be required in the development of smaller hospital units; they envisaged a re-distribution of those beds now concentrated in the larger units. The implications were not fully defined in relation to staffing or in the effect on the range and quality of service to be obtained by a redeployment of this kind. This aspect required further examination.

April 1968.

STAFF COMMUNICATION IN HOSPITALS

The need to improve communications is becoming a hackneyed phrase; nonetheless it is true. Many aspects of what is a complex problem affecting general efficiency and staff morale were raised and interesting views expressed.

Mr. G. G. Savage, Secretary and Treasurer of the Board of Management for Edinburgh Northern Hospitals, took the Chair.

Mr. T. E. Carruthers, Department of Psychology, University of Glasgow, considered basic characteristics of communication as tools in the form of ideas with which other speakers might work during the day. He noted that various concepts had been associated with the term "communications"; definitions varied and were affected by particular interests and points of view. A dictionary definition—"the act of imparting"—was somewhat restricted; "acts by which one organism triggers another" was more descriptive; "discriminatory responses of an organism to a stimulus" reflected the psychologist's interest; a mathematical concept might be "all procedures by which one mind may affect another", and to a professor of telecommunications, the subject was embraced by the organisation of a network of relationships.

In essence, any communication involved some type of message which was sent out and received. Depending on the culture and experience of those involved, the message may be in words, supplemented by various actions or gestures indicative of the sender's state of mind. Four essential components of a communication could be identified:—

1. A sender or a transmitter of a coded message.
2. A message.
3. A receiver able to decode the message.
4. A feedback indicating that the message had been received and understood.

Codes were the language or written words used to convey a message, and both sender and receiver were influenced in relation to these by their training and past experience. The recipients of messages might pick out the elements they understood best or those they wished to emphasise. In man-made organisations such as hospitals, groups of hospitals, or in ward units with various hierarchies of authority, instructions might conflict with professional or sectional interests; patients represented a significant group in this context. Even co-operating groups of people could become competitors in matters of finance, recognition, acceptance, status and prestige. In this general situation, the need for effective cross communication was stressed.

While the various codes used to transmit messages might be interpreted with differing emphasis, it was even more difficult to assess the role of the assumptions and expectations which influenced both sender and receiver. In these early training played a part; those, for example, with medical qualifications might understand each other more easily. Each person played a defined—and learned—role in relation to every other person, the nurse, ward orderly, doctor and others. Even the patient learned how to behave as a patient with a tendency to what was expected of passive, responsive and obedient dependency.

In relation to feedback, various hierarchies and professional components of the hospital service would interpret messages against their own particular background. The accountant would emphasise finance, the doctor and nurse the question of patient care. Unless understood, different approaches could lead to difficulties in communication and frustration due to blockage as a result of different types of motivation. It was also important to note that hospitals were places of anxiety, both to patients and staff, and this has led to the development of defence reactions. Unusual or excessive reactions were encountered and were suggestive of mental strain: emotional repercussions could stem from cross purposes, especially where motives were involved. Again, if the feedback indicated a lack of comprehension, further messages might be put out and understanding achieved. There was difficulty, however, when the feedback was thought to have been appropriate, although there was, in fact, some major lack of grasp, or, in written communications, when the feedback was unduly delayed.

It might usefully be considered in connection with human behaviour that perception, guided by the individual's knowledge and experience, was the basis of communication. The state of a person's current need also affected perception and thus the quality of communication. In this connection categories of human need were noted:—

1. Basic needs—for food, drink, sleep, sex.
2. Safety needs—for physical and mental self preservation.
3. Belongingness and love needs.
4. Esteem and status needs.
5. Self actualisation needs: fulfilment of self as seen by oneself.

Behaviour and expressions in groups and committees were also affected by a variety of motives and the various modes of communications. Communications would only be clear if there was congruence of the sender's and the receiver's codes and expectations and if neither was so maladjusted that there was distortion of perception of the situation or of the message transmitted.

Miss B. P. Millar, Matron, Royal Infirmary, Glasgow, considered that no organisation could exist satisfactorily and accomplish the purpose for which it was created if communications were poor. They required constant and positive attention by everyone employed in the organisation. Good communications were indispensable to management in general and good staff relations in particular. Efforts to improve the lines of communication had frequently to compete with the hospital "grapevine", which was undoubtedly speedy, but caused information to become distorted: a recent extension of the classical "reinforcements" becoming "3/4d." was "four extra pints" being reported as "four eczema patients".

Routine meetings between the matron, nursing and other staff in Glasgow Royal Infirmary were outlined:—

1. Daily meetings were held between the clinical assistants and their opposite numbers on night duty. The matron in turn met the night superintendent to discuss such matters as the night's activities in the hospital, sickness levels, overcrowding and the previous day's

correspondence. These meetings went a long way to avoid extraneous stresses and strains during subsequent night duty periods. In view of the information exchanged at these morning sessions, it was usually found unnecessary for there to be any further daily contact between matron and the night staff.

2. Daily meetings were held with the clinical assistant matrons to consider unit coverage and immediate patient and staffing problems. A formal weekly meeting was held to discuss policy matters including decentralising of offices, job definitions, areas of authority and lines of communication.
3. All Grades VII and VIII met daily to discuss unit and hospital coverage and patient dependency. Daily meetings were held with the matron to discuss routine affairs, and a regular afternoon discussion was held when incoming and outgoing correspondence was considered. The use of tape recorders was of particular value in reducing the time required for hand-over discussions.
4. Senior tutorial staff were seen weekly prior to interviews, and the administrative and tutorial staff held regular working lunches. Miss Millar indicated that other grades of nursing staff, including ward sisters, staff nurses and State enrolled nurses were seen by her by appointment, but officially monthly meetings were held to discuss problems, give information and outline proposed changes in policy. Regular informal visits, however, were made to the wards. These proved of value in clearing up misunderstandings.

In expressing opinions and for directness of approach, verbal communication was to be preferred to correspondence. Other methods were working lunches and informal meetings; these were held regularly with the medical superintendent and representatives of the clinical administrative and service departments. Links between nursing staff and the Board of Management were not considered entirely satisfactory. Direct representation of nursing problems was necessary. Co-ordination could not be complete until the nurse had an equal say in hospital affairs and to this end the implementation of the Salmon Report was welcomed. House committee meetings were rather ineffectual as their executive authority was limited. In conclusion, Miss Millar stressed the value of good communications in the co-ordination required in furthering the welfare of the patient.

Mr. A. Rawcliffe, Assistant Group Secretary, East Birmingham Hospital Management Committee, explained that the subject of communications was inherent to the organisation of patient care and the hospital service in any country. It was clear that what ever its content, communication was a large and complex subject and could not be comprehensively covered in a single conference. The word itself was not entirely satisfactory since it required too much explanation. It was essential to use simple language and the tendency of modern management to use "jargon" should be avoided. "Communication" was not simply a tool of management, and if it was unsatisfactory this indicated defects in the organisation as a whole. If things went wrong, a breakdown in communications was a frequent excuse.

The problem of staff communication was the process of relating some members to others, the creation of relationships where staff worked together sharing their ideas, feelings and attitudes. If communication was effective, work was done better and problems dealt with more efficiently. In the context of human relationships within the hospital organisation, the management had an important part to play and practices developed in commercial and industrial fields could be successfully applied. There were many common objectives, though the running of a business organisation was not strictly comparable with the management of a hospital. The patients' welfare had to be given over-riding priority at all times, and it was not easy to give full recognition to the effect of this on management. There were few commercial enterprises with a charitable approach.

The situation at East Birmingham Hospital was outlined. This new group created by the union of two hospitals, Little Bromwich Hospital and Yardley Green Hospital, came into existence in 1962. Two different systems of communications were inherited and proved singly and together totally inadequate for a district general hospital of some 900 beds and some 1,500 staff. In late 1964 a staff attitude survey had indicated a general feeling of "poor communications", based on a formal traditional organisation. Efforts were, therefore, made to reduce the gap between management and staff, bringing the middle grades, e.g. assistant matrons, superintendent radiographers, technicians, more into the picture. General policies were laid down and lines of communication shortened and clarified under a new one-tier system, between group departments, supplies, engineering ward and departmental level. In particular the following sources of information were made available to staff:—

1. A staff handbook for all grades outlining the group's background and policies.
2. A one-sheet weekly news bulletin with information on, e.g. progress or changes in the capital development programme.
3. Written standing orders outlining certain procedures, e.g. fire, major catastrophe, cardiac arrest, home dialysis.
4. For all heads of departments and "middle management", copies of revenue estimates and the programme to be embarked on—with relevant explanation.
5. A yearly issue listing the objectives of group policy.
6. A staff magazine ("Unison").

Regular meetings and study days were also started for all grades of staff, and these had boosted morale and contributed to the reduction in turnover of staff. The hospital secretary and matron met each morning, and with the chairman of the medical staff committee, weekly.

In the end the question of evaluation arose and, although the work had not proved difficult, there had to be a limit due to its time-consuming nature. Meanwhile, the processes of induction of staff continued and with the introduction of the Salmon Committee recommendations it was to be hoped that lines of communication would continue to be clarified.

Mr. I. W. Murray, Information Officer, Eastern Regional Hospital Board, Dundee, noted that of the

four Regional Hospital Board Information Officers in the United Kingdom, three were employed in Scotland. Other Boards provided information services by different methods; some employed private public relation consultants, others had their own public relations officer and nurse recruiting officer and some had direct links with local newspapers. The work of Leagues of Friends was also valuable.

The duties of the Information Officer covered a wide field, a good proportion of his time being taken up with routine press and television enquiries. Reference was also made to the types of publications produced in the Eastern Region. These included:—

1. A brochure for recruiting staff into all grades of the hospital service.
2. A staff magazine, produced quarterly.
3. Magazines produced for particular hospitals.
4. A one-page weekly news-sheet either for a particular Board of Management area or individual hospital.

It was explained that the production of these publications was very time-consuming and difficulties were frequently experienced in extracting news items from the hospital staff within the region. In practice it had been found that only 1/6th of the information collection sheets sent to staff were regularly returned. The collection of information depended largely on a personal approach to individual hospitals and on the enthusiasm of the Information Officer. Standards of production had to be maintained at a consistent level and any routine publication required to be issued at regular intervals. From experience, it was desirable for a full-time officer to be appointed to co-ordinate the activities of the various publications on a regional basis.

It was essential to recognise the importance of detail and of the presentation of material. Good headings and an attractive layout were necessary. The presentation must be eye-catching, simple and "snappy". Even a long news item only required a few sentences. Photographs and strip-cartoons were effective. The cost of publications could vary considerably depending on method of presentation but with the use of advertisements it could be reduced to a minimum. Mr. Murray concluded by noting the need for an appreciation of the time involved, the importance of good editing, and declared, "you can tell some people too much, you can tell others too little, you have to know your audience".

Dr. J. F. Kirk, Group Medical Superintedent, Glasgow Northern Hospitals, spoke from the Medical Administrator's point of view and noted that in the modern world every organisation required the making of decisions, co-ordination of activities, handling of people and evaluation of performance; all these were facets of management and all relied on effective communications. In recent years the Health Service had become increasingly aware of the needs for efficient management. This had been described by the Professor of Economics and Management at the University of Kentucky as having the following seven functions: decision making, organising, staffing, planning, controlling, communicating and directing. Each of these functions formed a part of everyday life in the hospital service.

Various organisational problems were outlined:—

1. Delay in dealing with routine correspondence from hospitals and Boards of Management by Regional Hospital Boards. This varied from weeks to months sometimes culminating with the admission that the correspondence had been misplaced.
2. Delay at Board level due to lack of communications between various departments. It should not be accepted that the size of an organisation was an excuse for poor or absent communications.
3. Delay at hospital level in dealing with routine matters because officers had not been given delegated responsibility. The method of correspondence was important since bad communication frequently led to undesired expansion of "grapevine" information.

Examples of bad communications were not infrequent and included:—

1. Those with too many words and no clear message.
2. Sudden instruction with little or no warning yet compliance expected within a few days.
3. Requests with no clear explanations.
4. Communication by edict: a dictatorial approach producing unnecessary and adverse reactions.

Over-communication leading to correspondence being treated as advertising literature was also a danger. There remained a need for staff to find some things out on their own.

Where several individuals or groups of staff were likely to be affected in particular developments, informal discussion followed by confirmation in writing was probably the most satisfactory method of communication. The use of Medical Staff Associations for specialised working parties and for participation in more complex projects was likely to prove valuable and have far reaching consequences. Effective answers could be reached on such matters as drug prescribing, clinical summary sheets and secretarial services for medical staff. Dr. Kirk considered that the main function of clinical summary sheets was to collect information, both statistical and clinical, and provide a frequent and intelligible feedback for medical staff. This encouraged more critical evaluation of patient care activities and as a form of "communication with intent" was appreciated by clinicians. If effectively maintained, they could lead to a more positive interest in the accuracy of recording at ward level.

Regular communication, preferably on an informal basis, was desirable between many grades of hospital staff as problems often overlapped two or more spheres of activity. It was desirable, therefore, that a supply of basic information should be made available at regular intervals throughout all branches of the service. The importance of Board members having a brief course of instruction in committee procedure, structure of the Health Service, functions of the various Boards and especially, on the functions and responsibilities of the senior officers, was noted A quarterly newsletter to the general practitioners in the area had also proved useful.

DISCUSSION

Dr. G. A. Scott, Medical Officer, Scottish Home and Health Department, opened the discussion. He

noted that communication was a vast subject with many aspects and meant different things to different people. When good, however, communications could raise morale and this in turn would be reflected in the standard of patient care.

Many types of situation were involved. Apart from direct influences on the patient/staff interface, there was the aspect of circulating general news, data on current affairs and also the requirements of those in particular groups and numerous—possibly too many —committees. Again, the effect of a hierarchical imposition from the "Salmon" recommendations could have an important influence.

Evaluation of communications was difficult. A good system might be reflected in a low staff turnover at all levels and high patient throughput. Probably, however, although subjective, the best evaluation lay in the atmosphere and friendly relationships within a hospital.

In the general discussion which followed the main points to emerge were:—

1. **Staff-patient relationships**

   In the past hospitals had not been built round the patient's requirements and consequently little attention had been paid to the views of patients or their relatives. With the concept of a therapeutic community, particularly in the psychiatric field, the situation had gradually improved. There had been a tendency for doctors and administrators to engage in selective listening and adhere to authoritarian attitudes. It was accepted that the aim of communication was to bring about change and with the development of social learning the situation was now moving from single to two-way communication.

2. **Patients' reactions**

   Various approaches to the problem of obtaining valid and considered patients' views and reactions were mentioned. These varied from visiting management committees and Leagues of Friends, to the issue of questionnaires and assessments by outside bodies. This latter type of survey was considered to be of value to hospital officers who had little time to determine priorities and who often had emotional involvement in the problems concerned. The preliminary findings of a working party on the subject had indicated that patients were more willing to express their views to independent bodies not directly involved with the running of hospitals.

   It was suggested that in view of the episodic nature of hospitalisation, patients were not inclined to press their views effectively but preferred to exchange them in an anecdotal manner. Various solutions for improving the situation were put forward and it appeared that although the introduction and circulation of information booklets had proved useful, the routes through which reasonable complaints and suggestions could be channelled should be more clearly specified. It was thought that patients would generally prefer to put forward their views by way of an "anonymous" complaints book rather than verbally; at the same time the validity of an assumption that patients should always have complaints was strongly challenged.

3. **Time factors**

   There was considerable comment on communications being affected by shortage of time. It was suggested that staff did not permit or the pressure of work did not allow enough time for the establishment of proper communications with patients. More emphasis on the less technical aspects of a patient's condition would be appreciated and better organisation in out-patient departments with suitable numbers of patients per doctor-session, particularly at the follow-up clinics, would go a considerable way to allow more time for patient-staff discussion and help to reduce the air of uncertainty which may surround a patient after consultation.

4. **Method of approach**

   Different methods of communicating from the informal conversations to the more official channels were noted. The general feeling was that there was no substitute for a personal approach although it was appreciated that the sender had to decide on the method of communication best suited to the receiver. Correspondence in simpler terms could lead to a considerable increase in the productivity of clerical staff. Examples of the introduction of flow charts were also quoted as being beneficial to certain grades of staff. It was also suggested that with the expansion of the National Health Service and an increase in the number of non-resident staff, the loss of community life had tended to reduce comradeship and morale.

5. **Staff morale**

   The influence of a good communication system on staff morale was endorsed. It was noted, however, that frustration could result if new ideas and if, for example, recommendations from courses of training did not find any expression in practice owing to an inherent resistance to change.

6. **Circulation of information**

   A considerable potential was recognised for the distribution of official publications indicating in broad terms the conditions which one would expect to meet in hospital. To ensure that it was read, any such information should be presented in a form which compared favourably with commercial productions.

7. **Joint consultative committees**

   Varying opinions were expressed on the value of joint consultative committees as effective lines of communication. On the one hand, it was useful for staff to have the opportunity of expressing themselves irrespective of grade, while on the other it was suggested that some might be reluctant to speak freely in the presence of more senior colleagues. There was no doubt, however, that within some Boards they served a useful function in management.

8. **Design of documents**

The existence of many poorly designed documents was noted and, indeed, a condition described as "memo-mania" was reported as prevalent in certain spheres. It was stressed that news-sheets and other means of written communication must be attractively presented and it was also important to recognise that not all members of the hospital staff represented a single level of literacy and understanding.

May 1968.

PRE-DISCHARGE OR "MINIMAL CARE" WARDS

The need to reserve "acute" wards for "acute" patients has become increasingly apparent and as a corollary, the place of a more domestic type ward unit in hospitals assumes greater significance. Many of the implications of this change of emphasis emerged in reviewing this subject.

Dr. J. H. F. Brotherston, Chief Medical Officer, Scottish Home and Health Department, took the Chair. He noted that over 100 years ago Florence Nightingale considered each hospital should have its convalescent branch and every county its convalescent home so that without exception no patient should stay a day longer in hospital than was absolutely essential. It was to bring the convalescent home concept up-to-date and to review the use of scarce resources in the light of what was best for patients that the recently published report *"Hostels" in Hospitals*?* was primarily concerned.

Dr. G. H. Scoular, Area Medical Superintendent, Ayrshire, drew attention to the fact that about 1 per cent of the population were withdrawn at any time from the world of the "well" into the hospital world where they were no longer free agents but "patients". They represented only a fraction of the sick people in the community. By far the greater number suffering from grave, slight, chronic or transient illness, from disabling or merely inconvenient conditions, were catered for outside the hospital. The number in hospital was conditioned by the amount of accommodation available, by whether they required facilities which only a hospital could provide, or because circumstances prevented them being suitably treated in their own homes. Inevitably, hospitals were somewhat artificial establishments orientated towards the needs of the sick. They were unsuitable and might be dangerous for those whose stay in a hospital bed was not necessary for recovery. There were, in addition, few more expensive ways of living than in an acute hospital bed. The average cost per patient week (acute non-teaching) in the Western Region for the year ended 31st March 1968, was £42. 3s. 8d. This did not include an element for capital expenditure or invisible costs such as sickness benefit, national assistance, loss of output, wages and tax. The real cost might be double this figure.

Despite knowledge of the dangers of recumbency and institutionalism, some patients remained in "acute" wards although at a stage of almost complete independence from medical and nursing care. In the concept of progressive patient care, patients were grouped according to their degree of illness and need for special care rather than by their disease or category. Intensive, intermediate and minimal care areas were widely recognised. With an average stay in "acute" wards of about two weeks, it was known that for the greater part of this time many patients would be ambulant and both able and willing to take care of themselves almost completely. It had been accepted that up to 30 per cent of hospital patients at any time might be in the minimal care category. This had led to the concept of pre-discharge or second-line beds, the importance of which lay in the influence they had on the use of "acute" beds. As this "pre-discharge" group had remained ill-defined, the analysis in *"Hostels" in Hospitals*? now published for the Nuffield Provincial Hospitals Trust, was particularly welcome.

* Oxford University Press, 21/-.

Kilmarnock Infirmary occupying a small congested site in the centre of the town served an estimated population of 180,000; it was built in 1868 and extended in 1912 to contain 145 beds (surgical 59, medical 48, orthopaedic 26, gynaecological 12). For many years the pressure on beds had been acute and it was obvious that there was a stage in the post-operative care of surgical patients when they required the minimum of nursing care and were able largely to look after themselves. As Stallworthy put it, "the solution is obvious, hospitals required for acute care should be used for that purpose and for that purpose only, with early patient transfer to a simpler, quieter, less expensive environment where medical and nursing requirements would be minimal. Emphasis would be on self-help and early rehabilitation".

The opportunity to establish a unit of this kind arose in 1958 when a generous benefaction allowed the purchase of a small sanitorium on the outskirts of the town. Some ten minutes by car or ambulance from the Infirmary, it was pleasantly situated with extensive views over open country. It was converted into a pre-discharge or continuation unit containing 28 surgical and 16 medical beds and called Torrance House. All beds have a bedlight and a call bell to the duty rooms. Bedside lockers are sufficiently large to take suits and dresses on hangers. There are large sunny day rooms equipped with lounge chairs, writing desks, radio and television. There is a small billiard table and dart board and considerable thought was given to the effect of colour on the patient's recovery. Every effort was made to create the atmosphere of a well-run hotel rather than a hospital. The medical wing consists of 8 two-bed male and female wards, the surgical wing has 4 four-bed bays for men and 3 four-bed bays for women. Each of the bays opens directly on to a sun verandah; privacy is provided by pull-round bed curtains. There are two large dining rooms each with a waitress service.

All patients must be ambulant and wear their own clothes, they must be fit enough to walk to day rooms and dining rooms. No bed-pans are used. All surgical dressings and examinations are carried out in a treatment room. Physiotherapy is not given as a routine but is available if required. If for any reason a patient becomes unable to walk to the dining rooms he is transferred back to the parent hospital. In general, the operational policy has remained unchanged since the unit was opened in May 1959, the salient points being:—

(*a*) Medical and surgical patients are transferred for a period not exceeding three weeks.
(*b*) All patients must be ambulant; any patient becoming again bedfast is transferred back to the Infirmary.
(*c*) All patients must be able to wash, dress and attend to toilet.

On average, patients are transferred three days after such operations as herniorrhaphy and appendicectomy; after more major procedures such as gastrectomy and cholecystectomy, they stayed a day or two longer before transfer. Transfers took place daily, the patients being assessed the day before.

Post-operative care remained the responsibility of the surgical staff of the Infirmary and a daily ward round was done by at least one consultant surgeon accompanied by a registrar and a house surgeon. A consultant physician visited weekly for a full ward round of medical patients. In addition to a matron (shared with an adjacent long-stay geriatric hospital) and one administrative sister, the nursing staff was four full-time and three part-time staff nurses, one part-time enrolled nurse and five nursing auxiliaries, two of whom were full-time and three part-time. This gave an equated figure of eleven for forty-four beds.

Experience had shown that by deliberately providing such a unit for ambulant, post-operative patients, more economic use could be made of the expensive facilities in the acute general hospital. Early transfer freed a surgical bed for a patient who more urgently required it. Early movement of medical patients had been limited by the policy of restricting admission to ambulant patients only. The average stay was six days for surgical and eleven days for medical patients.

In the financial year 1967/68, the average total occupancy was 61 per cent (surgical 72 per cent, medical 42 per cent). About three-quarters of the total occupied bed days related to general surgical, and one-quarter to medical patients. The patient-week rate at Kilmarnock Infirmary, including consultant and specialist staff costs was, at present, £45. The patient-week rate at Torrance House, again including these staff costs, was £22. The saving was thus £23 per week, per patient.

From the patient's point of view the advantages were considerable, they appreciated being away from the busy acute ward where noises, sights and smells might offend and deaths were not infrequent. Their rest was not disturbed by night admissions or confused fellow patients. The pleasant environment and the opportunity to walk or rest at will, contributed to rapid physical and mental rehabilitation. General practitioners reported an earlier return to active life and work.

In conclusion, Dr. Scoular noted that a pre-discharge unit, although largely based on self-care, did not run itself. It was not merely a place to which patients were sent to make room for the more seriously ill. Active interest and continued supervision on the part of the consultant staff was essential if the patient was not to be left with the impression that now he was recovering, his welfare was of no great importance. The pre-discharge unit must be seen by the patient to be an integral part of an efficient hospital service.

Professor D. J. Newell, Nuffield Department of Industrial Health, Newcastle University, explained that the concept of the pre-discharge ward at Durham arose from the consideration of emergency patients. The pattern of emergency admissions had been studied and it was found that the daily number of such admissions followed a well-known statistical pattern. It was possible to create theoretical models relating the number of emergency cases per day to the available empty beds. It had been found that 19 out of 20 patients would have a bed immediately available if two beds more than the average daily demand were cleared for each day's working. It was an important finding that the same figure applied whether the demand was one per day or 30 per day or a number in between. At one per day, 3 beds were needed each day to satisfy 19 out of 20 admissions; at 30 per day, 32 beds were required. In a hypothetical hospital with strict barriers between departments—so that a neurological bed could not be used for a neurosurgical patient, a male bed for a female patient, or a private bed for an N.H.S. patient, etc., there might be 30 little watertight compartments. For one emergency per day, each would need to provide three beds per day and thus 90 (3×30) beds would be needed for emergencies. If these barriers were broken down and the total demand of 30 per day were treated as a whole, only 32 beds per day would be needed; this would give a tremendous saving.

One way of achieving this was to have a common admission unit for all patients and this worked satisfactorily in some war-time situations. An alternative was a common pre-discharge ward. This meant that each unit would fill its beds with patients, then, when an emergency arrived, a patient nearing discharge was transferred to the pre-discharge unit. This unit was thus a safety valve for all the wards and could admit patients of either sex and from all specialities, except from paediatric and obstetric departments.

This statistical theory has been put into practice through a generous grant by the Nuffield Provincial Hospitals Trust at Dryburn Hospital, where there were 220 beds, excluding those for children and for maternity work. At this hospital a pre-discharge ward unit of 22 beds, i.e. 10 per cent of the total, was provided in 1962. It is linked to the main hospital by a covered corridor and is near the departments of physiotherapy and occupational therapy. Each doctor maintains responsibility for his own patients on transfer. The delicate problem of medical management had been overcome by the co-operation of the medical staff and by appointing the consultant in physical medicine to be responsible for the ward. He had relatively few beds of his own and was thus suitable in terms of responsibility, as well as personality, to act as a referee.

Experience had confirmed the main planning assumptions and statistical details were:—

The pre-discharge ward

	Year 1	Year 2	Year 3	Year 4
Average length of stay (days)	4·9	5·3	5·1	5·3
Average daily bed-occupancy	13·3	17·3	17·6	17·5
Patients returned to acute wards	39	54	52	42
Patients transferred to convalescent hospital	49	59	73	34

Source of pre-discharge ward patients

	Year 1		Year 2		Year 3		Year 4	
Wards	No.	%	No.	%	No.	%	No.	%
Medical	318	32	322	27	206	16	262	22
Gynaecological	293	30	405	34	445	35	424	35
Surgical	369	38	474	39	610	49	512	43
All wards	980		1201		1261		1198	

Waiting list admissions and immediate admissions

	Control Year		3rd Year	
	W.L.	Imm.	W.L.	Imm.
Medicine	576	1124	289	1433
Surgery	743	1132	1044	1033
Gynaecology	523	312	917	439

Dr. A. Zinovieff, Department of Physical Medicine, Dryburn Hospital, Durham, explained the way in which practical experience had modified the original idea that the ward unit should be used exclusively as a means of providing extra beds for an emergency admission to acute wards.

It was decided at first to limit the stay of patients in the ward to five days with the result that in the first few months the average period of stay was only three days. Because of this short length of stay, certain resistances developed—the patients found it unsettling to be transferred for such a short period to a new environment, the nursing staff found that looking after short-stay patients for a few days was uninteresting, and the consultants experienced difficulty, particularly on the medical side, in selecting suitable patients. After three months, therefore, it was decided to allow a stay of up to seven days—as a result of which the average period of stay increased to five days. This modification had proved entirely satisfactory. It had not invalidated the original concept of the ward but allowed an important secondary function to develop, namely, to assist clinicians, particularly surgeons, to cope with their waiting list admissions without having to worry about beds for emergency admissions. This had proved valuable for those clinicians with relatively few beds in the acute wards and, in particular, the gynaecologists had achieved a marked increase in their turnover of patients and a significant reduction in waiting lists.

The Nuffield Ward at Dryburn had 22 beds arranged in 5 rooms of four beds and 2 single bedded rooms. Each room had its own lavatory and washbasin and there was locker-room space. Two bathrooms were provided and, in retrospect, it would have been better to have had shower accommodation in relation to each of the bedrooms. There was plenty of sitting space and all the rooms were light attractive and well furnished. This, together with the fact that patients used their own clothes and went to the communal dining room for meals, had had a stimulating effect on the process of rehabilitation; within two or three days of being in the ward the patients began to look and to feel much better. From a study of patients' reactions and the advantage of a suitable environment, together with the lack of disturbance at night, it was clear that for the great majority their stay in the ward was both beneficial and pleasant. Dr. Zinovieff considered that "homeward bound", the title to be used by Guys Hospital for a similar unit, was appropriate in describing the patient's attitude.

When the ward was first opened it had 9·7 nurses, of whom 3 were State-enrolled and 4 were nursing auxiliaries. This was a slightly lower ratio than in the actute wards. Since then, the nursing establishment had been gradually reduced and altered in character. The present establishment consisted of 1 full-time sister, 1 part-time sister, 1 full-time staff nurse, 3 part-time staff nurses (equivalent to 1·6 full-time nurses), 2 State-enrolled nurses and 1 student nurse—making an effective total of 6·6 nurses. This was quite a considerable reduction on the original total. With this establishment, however, the sister was unable to provide 24-hour cover in times of holidays and for sickness without a relief from the general pool: with this the total might be about 8 as against 11 for the acute wards.

The increase in ratio of State registered nurses was an important practical point. When there was only one nurse on the ward she had to deal with all situations occurring with the patients themselves or in arranging transfers from acute wards. It was found that nursing auxiliaries, and to a lesser extent State-enrolled nurses, could not always cope. Although some 95 per cent of the patients in the pre-discharge ward at any time were in the minimal care category, the extension of the possible period of stay meant that some patients were transferred at intermediate nursing care level. This meant that nursing duties included some wound dressings, the removal of stitches, the management of intercurrent infections, the continued training of colostomy and diabetic patients and occasionally the charting of blood pressure and apex beats for medical patients. A change had also been made in the traditional method of handing out drugs to patients. The time consuming medicine round had ceased and it was now the usual practice for the nurse to give patients who were still on drugs a day's supply in the morning with written instructions. During the day the nurse could keep an eye on whether or not patients were taking their tablets correctly. It was surprising how often it was discovered, particularly with elderly people, that they did not adhere to the instructions especially when taking several types of drug. When this occurred consideration could be given to simplifying the schedule. Where this was possible the general practitioner could be warned of the patient's difficulty so that he could provide closer supervision after discharge. A recent count of 19 patients showed that 12 did not require any medicines, of the remaining seven, six were being given the daily issue each morning, and only one, an elderly woman, was given each dose of tablets by the nurse as directed.

By far the greatest numbers admitted to the pre-discharge ward were from the surgical side of the hospital. Of the five surgical-type wards, three transferred patients as a routine, the other two when under pressure. The senior nursing staff in the acute wards had shown a good deal of enthusiasm for the new unit as it gave them the opportunity of making beds available for both emergency and waiting list admissions. On the medical side there was less enthusiasm, though the ward had been found to provide a useful "cushioning" period for some groups of patients such as cardiacs. Two of the acute wards had mainly geriatric patients and, while almost always under pressure, were rarely able to find suitable cases for transfer on a short-stay basis. Of the other two acute wards, the sister in one was not keen on the pre-discharge ward as she liked to see her own patients through all stages of hospital treatment; the other was enthusiastic about the pre-discharge unit and found it of considerable value when her ward was under pressure.

Of the consultants, the gynaecologists were unequivocally in favour of it. The ward had allowed them to do more work and in proportion to their number of acute beds, they used it more than any other specialty. Their patients accounted for about one-third of the admissions to the pre-discharge ward. While the ward had become completely accepted within the structure of the hospital, there were some differences of opinion in other specialties on how effectively it worked as a "safety valve". While on only two occasions in the last eight months had it not been possible to accept an urgent transfer to the pre-discharge ward on the day requested, new regulations for admission were made about four

months ago to try to safeguard the "safety valve" principle. It was agree that:—

(*a*) Two beds should always be available for emergency transfer.

(*b*) Transfers could be made at any time during a 24-hour period, if necessary.

(*c*) Booked transfers would be accepted on the basis that if emergency demands were made on the Nuffield Ward beds, booked transfers would be cancelled.

The reasons why the surgical side found the pre-discharge ward more useful than the medical side was probably because surgery was, to a greater extent, "done by numbers". The period of stay of the patient could be guided or more exactly predicted and the selection of patients for movement to a pre-discharge unit for a limited period was relatively easily done. Thus, an appendicectomy, a gastrectomy, or a hysterectomy were expected to stay the allotted number of days. This number varied from surgeon to surgeon and from hospital to hospital. The length of time a patient should stay in hospital after various operations required further study, more uniformity would make the programming of work still easier. The physicians, on the other hand, had less easily defined patterns of work.

In general it could be concluded from personal observation and from the data, that the pre-discharge ward successfully fulfilled the dual purpose of providing a "safety valve" and in helping to deal with waiting-list admissions. It had been found that by giving patients a longer period of "convalescence", the total period of stay in hospital was not increased. A few still questioned the "safety valve" effect and the only way to resolve such doubts was by further research.

Miss A. Court Brown, Regional Nursing Officer, Western Regional Hospital Board, reviewed the use of nursing resources as a vital part of the problem. She noted that some hospitals had no difficulties in the recruitment of nursing staff, whilst others, either because of the area in which the hospital was situated, or the type of specialty offered were continuously understaffed. There were also instances where nursing staff was available but the money was not, and in some hospitals it was well known that highly skilled registered nurses were undertaking basic nursing duties that could be done effectively by less skilled personnel. There was little hope that the position as regards recruits would change in the near future. The years of plenty, if they ever occurred, were over, no repeat of the "bulge" in the numbers of school leavers was forecast for the near future.

Nursing remained a predominantly female profession. About one-third of the labour force of the country consisted of women and they represented the only available reserve of labour power. The number of single women was expected to decline and by 1973 it was estimated that 29 per cent of women at work would be over 50 years of age and 60 per cent would be married. Women could withdraw into their home at any time and with very little warning. It appeared that the country would have to rely on women to work in two stages—up to the early twenties and after 40 years of age. A recent survey showed that 31 per cent of male nurses came into nursing because of their experience as an orderly or a sick-bay attendant in the armed forces. With the decline in that activity there could naturally be a decline in men entering the nursing profession. These figures showed that there would be little increase in the female labour force and that there will be fewer single women at work; there would be a greater dependence on married women and, unless nursing as a career could offer benefits not otherwise available, men would not be attracted into the profession.

Two factors were important in any assessment of the numbers of nurses required in the future, the effect on manpower of the hospital building programme, and the continuous advance of medical science. It was salutory to work out in terms of personnel and grades of personnel the requirements of particular schemes. In the Western Region the results of such exercises in relation to new district general hospitals were now beoming apparent. Staff ratios represented a controversial subject, but it was essential that some form of ratio was applied to hospitals built to the current Planning Note standards. This would, of course, be greatly facilitated if ward units were built to similar if not standard designs; they should express the same functional requirements, availability of services and the dominant need for flexibility in use.

In the Western Region previous formulae were not found helpful in the context of current ward planning and it became necessary to examine schedules of accommodation and sketch plans and consider each ward and department individually and in detail against the anticipated pattern of work and the prospect of a bed occupancy rate of 85 per cent or more. From this and from practical experience of nurse staffing, both in teaching and in district hospitals, and after working out duty rotas and building up the staffing requirements over 24 hours, a realistic picture began to emerge. Not only was the number of staff on duty on each shift estimated, but the division into different grades to give an adequate level of skilled nursing care was considered, together with the amount of nursing time per patient that would result over a 24-hour period. The calculations were done in the assumption that a full "topping-up" service would be provided as well as such services as plated meals. Having achieved the number of nurses for a 24-hour service, this was adjusted to provide for a full week. To this total a percentage was added for holidays, sickness and absenteeism and the theoretical and secondment programme of student and pupil nurses was taken into account. This latter point has frequently been underestimated. From practical experience with the wider basic training regulations, it was apparent that the percentage of student and pupil nurses' time away from wards and departments could be as much as 18 per cent to 25 per cent.

Having arrived at estimates, it was interesting to compare these with the results of the assessment on the Falkirk Ward, where a detailed study had been made of the numbers required for the 60-bed floor. The total numbers required at Falkirk were considerably less than the original estimate for that ward unit, but they compared almost identically with the ratios calculated for a basic ward unit—the only difference being the effect of a 40-hour week. The ratios also took into account the helpful enquiry into the deployment of nursing staff by the Ministry of Health in a study made in 121 hospitals in England, Scotland and Wales.

These ratios had been applied to six new district general hospitals in the programme for the Western

Region and, as far as possible at this stage, the requirements for senior nursing staff had been estimated on the Salmon Report recommendations. It became immediately apparent that a considerable number of staff would be required over and above the basic number for the bed areas. For example:—

A 700-bed district general hospital required 453 nursing staff for the actual in-patient bed areas, 126 for the other departments (operating theatre, intensive therapy unit, out-patient department, day wards etc.), 96 as reliefs (for holidays, sickness and wider basic training programmes), 40 student and pupil nurses on secondment and 15 administrative staff.

The estimated total of 730 was divided into the following grades:—

270 qualified
250 student/pupils
210 nursing auxiliaries, etc.

The division into grades came out at approximately one-third of the total in each case. In many hospitals at present the proportion varied widely. This was partly due to the availability of some grades, but two hospitals recently visited had no nursing auxiliaries or orderlies on the staff.

A comparison of staffing requirements for new district general hospitals about to be built revealed significant differences between the numbers required for the new hospital and the numbers employed in existing services. This was a frightening exercise. Two examples were given:—

1. In one area with 763 beds in nine hospitals the proposal was to increase provision to 943 beds in five hospitals. The present staffing was:—

483 nurses including:—
162 qualified
128 student/pupils
193 others

For the future, 811 would be required, an increase in staff of 328.

2. With 952 beds in ten hospitals in another area, the proposal was to increase to 1,406 beds in six hospitals, a difference of 554.

The present staffing was:—

649 nurses including:—
252 qualified
102 student/pupils
295 others

For the future, 1,268 would be required, i.e an increase of 619. These would be 234 qualified, 180 student/pupils, 205 nursing auxiliaries.

Where were the additional staff to be found to meet the requirements of the hospital building programme and the rapidly increasing medical demands for skilled nursing personnel? Medical research would inevitably continue and demands for skilled nurses were likely to increase even before many of the new hospitals were built. It was, therefore, essential to look critically at the available resources and their effective use and to group patients more strictly according to their nursing dependency. Traditionally a form of progressive patient care had been undertaken in the Nightingale Ward with the more seriously ill patients grouped nearest the nurses' desk. In the same ward were fully ambulant and semi-ambulant patients. The assessment of the new surgical ward at Falkirk had been most instructive. The integration of an intensive nursing care area with the related intermediate beds had presented little difficulty. Separate intensive therapy units of the kind likely to be required in large hospitals would have heavy staffing commitments. Each patient might require one nurse for every hour of the day and night, and perhaps even more. To provide this level of highly skilled personnel it was essential to look closely at the intermediate and minimal care areas.

At Falkirk between 44 per cent and 54 per cent of the patients in this busy surgical unit were fully ambulant. The study leading to *"Hostels" in Hospitals*? showed that some 20 per cent of patients in teaching hospitals and 25 per cent of patients in district general hospitals might be better placed in a minimal care area. These patients did not require to be nursed in the most expensive type of ward and were, in fact, being over-nursed now. If they were accommodated in units not requiring the full services of an acute ward they would be less demanding on skilled staff who could then be concentrated on acute areas where patients had a high nursing dependency. It was essential, however, that a "supporting bed" unit should not be provided in addition to the total number of acute beds, if that were done, the position would revert to square 1 or even minus 1.

The staffing of a minimal care or pre-discharge unit of substantial size had been shown by the survey team to be capable of a substantial saving in the total number of staff, though no redundancy in nurse staffing would be involved as they could be redeployed to other areas. The size of a unit of this kind as part of a hospital complex would probably require further discussion but in the light of the inevitable and difficult nurse staffing problems ahead, it might form an important contribution to allowing medical progress to be expressed in hospital work.

Mr. J. Leithead, Chief Executive Officer, Research and Intelligence Unit, Scottish Home and Health Department, spoke of the review of literature, the survey work, the consideration of building and staffing problems which lay behind the report on the need for pre-discharge wards. He noted that bed usage was of the first importance both in the quality of patient care and in relation to the economics of hospital provision. Improved levels of usage appeared to be possible. In England and Wales, with a lower number of acute beds per head of the population than in Scotland, the average duration of stay and the turnover interval were less, yet the percentage of bed occupancy was higher. In relation to the capital cost of hospital building and to problems of nurse staffing, however, exhortations to reduce lengths of stay would be of no avail unless beds were also given up. To reduce, for example, the bed occupancy rate by, say, 10 per cent and retain the same staff would lead to minimal savings and in fact the cost per patient treated would rise. To add a pre-discharge ward unit and keep the same number of acute beds would increase both capital and running costs; to replace a proportion of acute beds by a unit of a more domestic type could, if this was acceptable, provide definite economies and might lead to the development of an area of hospital provision which could link effectively with general practitioner and other services in an area and in which rehabilitation could be given increased emphasis.

The original Hospital Plans did not refer in detail to "supporting beds" and by 1965 it had become increasingly clear that if acute beds were to be used to the maximum advantage and if the intensive care areas in hospitals were to continue to develop, the

potential economies at the non-acute end of the scale required detailed examination. The added importance of minimal care areas flowed both from their effect on the acute bed and from a realisation that the ambulant, self-reliant patients, who still required some hospital supervision, were in fact badly placed in ward units not designed for their particular requirements.

The study by a consultant physician, a senior nurse, a research sociologist and himself, had been directed from the Scottish Hospital Centre and had taken slightly more than one year. It was made possible by a grant from the Nuffield Provincial Hospitals Trust and had included a survey of over 4,000 staffed beds in various types of hospital. Even after considerable experience, the medical and nursing dependencies of some patients had proved difficult to assess and this had confirmed the decision to undertake a smaller but more direct survey and not to rely on assessments—which were bound to be subjective—by a variety of people using questionnaires. Even so, it was not claimed that a very high degree of accuracy had been attained. A different team of workers from the same disciplines might have produced slightly different answers, but the sample of patients included in the census was classified with as much uniformity as was possible and probably more so than in previous survey work in this field.

The survey classified patients both in terms of medical and of nursing dependency and in this sense it was unusually detailed. Fourteen medical categories were distinguished and were described in the report. It was noteworthy that patients with a high medical dependency were not necessarily in the highest or even the middle of the three main categories of nursing dependency. Some 30 per cent of the patients surveyed in teaching hospitals and 36 per cent in district general hospitals could have been accommodated more suitably in accommodation other than acute wards. Within these groups the major proportion were those who, while in hospital for a variety of reasons, could be classified as minimal care patients. As expected, the proportion varied between specialties but overall they represented about one-quarter of all the patients surveyed. It did not appear that acute beds were significantly blocked by old people and this view was supported by a check survey carried out with the help of medical social workers at six large hospitals. The percentage of patients of this kind in teaching and in district general hospitals represented just over 5 per cent of the total. Of 142 patients covered by this percentage, only eight were considered suitable for transfer to a local authority old persons' home. Understandably the highest proportion of geriatric patients was found in medical wards. In surgical wards, individual clinical practice led to wide variations in patients' length of stay; these diversities had far reaching consequences and clearly merited professional review. In orthopaedic surgery, particularly in teaching hospitals, the proportion of patients requiring minimal care was rather higher than in some other specialties. The reasons for this were not clear but it was noticeable that where, for example, early pinning of femora was practised there was a more rapid turnover of patients.

The highest proportion of acute patients were found in the gynaecological wards with only one in seven in the minimal care category. There appeared to be a shortage of beds for this specialty and opinions were expressed in several areas that the pressure on beds was excessive and that additional operating theatre and anaesthetic facilities were necessary. It was noticeable that, while the position varied with different types of geographical area, the need for straightforward hostel accommodation was very small in relation to any specialty.

To allow a more realistic study of the costs involved in providing a purpose-designed unit for pre-discharge or minimal care patients, and to add reality to the supposition that by assuming a more domestic type of service, skilled nursing staff could be deployed elsewhere in the hospital, a hypothetical unit containing two floors of 50 beds, i.e. a total of 100 beds was prepared. This unit was not regarded as a prototype design but as a credible basis for costing studies. It incorporated a large proportion of single roomettes as it was considered that in the pre-discharge stage, patients would value a separate room in which to sleep, rest, read or write. The building costs of this unit worked out at about two-thirds of the cost of an acute ward, using Building Note standards. Allowing a domestic service equivalent to a four star hotel, the residual nurse staffing demand was relatively small.

Mr. Leithead stressed that it would be necessary to conduct a practical experiment in purpose-designed accommodation to confirm the various assumptions. From the hypothetical study it was suggested that for a 100-bed unit of the type envisaged, thirteen nurses would be required as against some 44 in four 25-bed acute wards. Another important aspect of the proposal was the evolution of a more defined hospital area in which health education and rehabilitation could be practised and where a more active environment for patients would be salutory. This would encourage more intensive rehabilitation than would be possible by patients returning at intervals from their homes and at a time when the patients were most receptive to it. It was also probable that in units of this nature the general practitioner could play a most important role in linking the hospital with domiciliary care.

DISCUSSION

Professor J. A. Strong, University Department of Medicine, Western General Hospital, Edinburgh, opened the discussion. He welcomed the collection and presentation of facts, so far as they could be ascertained, and considered that the "safety valve" principle had much to commend it, especially in winter. Additional outlets from acute ward units were necessary particularly from medical wards and in relation to elderly patients. Precise but flexible thinking would be required on the future pattern of hospital provision in view of the forecasts of nurse staffing. Radical changes might be necessary in the light of the need to redeploy skilled nursing staff. If purpose-designed accommodation for pre-discharge patients was provided, it might be adapted to several uses. Adaptability might in fact be essential as the pattern of work would change in the course of the next decade. Joint treatment and management of patients represented a trend in medical practice; it was a rational approach and might shorten patients' stay. It was possible also that clinicians might lighten the load on ward beds by a more critical appraisal of patients prior to admission and, in some specialties, by an increase in treatment on an out-patient basis.

Professor Strong noted the great value to a patient's morale of being ambulant and wearing his own clothes. In hospital clothing or a dressing gown he retained the attitude of a sick man. At the same time, transfer to another unit within the hospital would require to be understood and accepted by patients. A pre-discharge ward might be an area in which the general practitioner could function very effectively in the transition stage between hospital and home. This might also help in gaining the patient's acceptance of the new type of accommodation suggested.

The main points which emerged in discussion were:—

1. **Definitions**

More than one speaker noted that discussion of this subject was rendered more difficult by the various definitions used and the fact that the most appropriate title for a pre-discharge or minimal care unit, second line unit, homeward bound unit, etc., had not yet emerged. In discussing this type of provision, it was most important to define its purpose and the range of activity to be accommodated.

2. **Quantitative factors**

The size of a pre-discharge unit in relation to the number of acute beds in a hospital was the subject of considerable discussion. On the one hand it was suggested that with a shortened duration of stay, an increase in outpatient therapy and closer selection of patients for admission, the number requiring pre-discharge or minimal care accommodation would be small in hospitals other than those which accommodated regional specialties. Others noted, however, that even with improved housing conditions and a greater range of facilities available to general practitioners, early discharge of patients from acute wards was not always practicable. Many patients lived alone or had a husband (or wife) who was working and might be unable to provide the necessary level of home care. Again, earlier return to normal duty might be achieved by more concentrated rehabilitation in the pre-discharge phase and valuable liaison with general practitioners and domiciliary nursing care would be facilitated by purpose-designed accommodation.

3. **Link with the parent hospital**

It was accepted that to allow the necessary medical and nursing supervision, a pre-discharge unit should form an integral part of a hospital complex. A suggestion that pre-discharge patients should be accommodated in specially designed areas on each main ward floor was not supported insofar as it would be difficult, if not impossible, for the positive characteristics of a pre-discharge unit to emerge. There would be a loss of flexibility between specialties, the potential economies in capital expenditure and in the deployment of nursing staff would be denied and liaison with general practitioners and others would be impeded. A design which allowed flexibility in use between various categories of acute patient was different from interchangeability between the needs of acute patients on the one hand and pre-discharge patients on the other. Accommodation designed for acute patients was unsuitable for pre-discharge purposes, and the reverse was also true.

4. **Bed groupings**

While it might prove difficult to avoid an institutional atmosphere in a unit composed almost entirely of small single rooms, it was recognised that the inclusion of a high proportion of these would be valuable as regards flexibility in use. It was suggested that if the unit was also to contain patients admitted for day treatment, some 4-bed rooms might prove useful. In one new unit of this kind, 2-bed rooms were a feature. While two patients per room were not generally favoured for an acute unit, the acceptability of this in a minimal care unit would be shown by experience.

5. **Blocked beds**

It was noted that any blockage of acute beds created back pressures in the organisation of hospital care. While many elderly patients in acute wards were suitably located, insofar as their admission was in respect of an acute illness, there was a need for further outlets particularly in relation to medical units.

6. **Organisational problems**

It was clear that the organisational control of a pre-discharge unit would have to be clearly defined and accepted particularly by consultant staff. Related to a system of clinical divisions, however, and with a firm policy concerning rehabilitation, the links with local authority services and other interests, effective organisation was not impossible.

7. **Radiotherapy**

The view was expressed that both for patients and staff there was some advantage in pre-discharge patients remaining with those more seriously ill in the acute ward units.

8. **Building Notes and Cost Limits**

A suggestion that the development of pre-discharge or minimal care units was inhibited by the absence of specific cost limits was authoritatively denied.

9. **Further study**

There was general agreement that this area of patient care was one which for many reasons justified further practical study as soon as possible. The early units had shown encouraging features but had been conditioned to some extent by the pressures of individual situations. Clearly defined experiments in which a certain number of acute beds could be replaced by purpose-designed pre-discharge units staffed on more domestic lines, would assist in answering many of the questions which still remained.

June 1968.

THE PLACE OF SYSTEMS IN HOSPITAL BUILDING

Experience with system building was outlined at this conference and it emerged clearly that its potential had not been as fully appreciated in the hospital field as in others.

Mr. R. G. Clark, Director of the Scottish Design Centre, took the Chair.

Mr. B. Annable, an architect, Deputy Chief Executive of the National Building Agency, reported on experience with system building outside the hospital field. The increased demands on the building industry had been predicted by the 1964 National Plan to rise by 30 per cent in five years and 50 per cent in ten years, whereas building manpower would only increase by 4·5 per cent. Most of the 80,000 building firms were very small organisations, employing less than ten men. One-fifth of all building work was on maintenance, where it was difficult to improve productivity. There had been an overall increase in the building industry of 35 per cent per operative during the last ten years; this was largely due to the widespread introduction of mechanised tools and site plant and the use of factory-made components. Increased productivity depended on less wasteful use of labour, increased mechanisation on the site, and mass production of buildings and components in factories. Success with industrialisation depended on arranging large programmes offering continuity and standardisation. Administrative and other divisions presented difficulties, as for instance in local authority housing in Scotland, where 9 out of 238 authorities were responsible for 50 per cent of the total, and 4 of 187 firms did 50 per cent of the work. At present, system building accounted for about one-third of the housing total.

Mr. Annable then sketched the historical background of the industrial revolution and the development of mass production techniques in, for example, the motor car industry. Industrial methods had had some effects on architecture fifty years ago and were seen in the housing field in this country before the War on an experimental basis but with no co-ordination of the demand. The first real programme was in 1948 when the temporary housing programme gave rise to the production of pre-fabricated houses. Since then a large number of systems had developed for the building of permanent non-traditional houses.

The crash programme of school building after the War coincided with acute shortages of labour and materials. The school architects in Hertfordshire, where the need was particularly acute, rejected prefabricated huts as a solution and sought instead the flexibility of grid planning, and developed the "Meccano" kit of parts which comprised the Hills system. From 1949 the Ministry of Education encouraged industry to develop a number of proprietary systems. In 1954 Nottinghamshire, faced with the problem of mining subsidence, collaborated with Coventry and Derbyshire in developing with a steel manufacturer the CLASP system. The combined programme assured the new system of an adequate market. Other education authorities had since joined the consortium and over three hundred CLASP buildings had been erected since the first school in 1957. The Government had since encouraged the consortium approach, and now nearly all Education Authorities in England and Wales were members of one of the consortia.

Housing consortia had also been set up, some developing their own systems, others providing programmes and performance specifications for tender. The National Building Agency was set up in 1964 to promote the consortium approach, and to get authorities to pool their programmes, and to encourage industrial participation. Consortia were a means of creating market conditions suited to industrialised buildings, but the difficulties in reaching an agreement were enormous and progress slow. The few successful ones, mainly in educational buildings, had made a great contribution but builders had been somewhat left out, and the level of mechanisation was low. The N.B.A. acted as an "honest broker" in bringing together systems and collecting programmes, but Mr Annable believed that a "shot-gun wedding" was needed between the clients and building systems.

At present about 40 per cent of all public housing and schools were system-built. In high rise housing, systems could offer cheaper and quicker results than traditional building (especially no-fines and pre-cast concrete); in low rise building there were less clear advantages, with no-fines and rationalised traditional building showing up best.

In schools, component systems operated by consortia, usually based on light steel frames, were giving good results. Attempts were now being made to move from batch production supply to mass production supply by agreement between consortia about interchangeable components. This was not yet fully effective and more work was needed on mechanisation and erection problems.

Mr. Annable listed what the client could do to benefit from industrialisation. He could arrange long contract programmes with continuity of work. (This frequently required joint action by a number of authorities.) He could establish programme design standards and cost limits and determine building performance standards. He must identify user requirements.

An example was given of the results that could stem from this kind of approach; it referred to the programme of school hostels currently in progress in Scotland. Buildings with similar requirements were needed quickly in a number of remote areas. These areas had an expensive building record and there was a shortage of professional and building resources. The solution was a co-ordinated building programme with four main features:—

(*a*) A central management team (Scottish Education Department, National Building Agency, and the local authorities and private architects involved).
(*b*) One contractor (assured continuity of erection).
(*c*) One system (guaranteed production of components).
(*d*) Standard designs.

The result was buildings completed on time, inside the cost limits and to the satisfaction of the users. In conclusion it was asked, "If this approach paid off in building outside the hospital field, why not for hospitals?".

Mr. W. J. Jobson, Regional Architect, Sheffield

Regional Hospital Board, made reference to Stonehenge, "the first system job". He pointed out that hospitals included various types of buildings—residential, office, industrial, educational and clinical —and that apart from clinical, existing systems covered all types.

It was in the highly specialised but relatively small market of clinical building that a client-based system could be associated with a viable programme. Factors which argued for industrialised building included a shortage of professional staff and skilled labour, exacting user requirements, and the time taken to train staff who would occupy the buildings. It implied variety reduction in operational procedures, thus leading to standard solutions wherever possible—standard room data sheets, standard room layouts, standard building components, standard methods of construction. Difference cost money; repetition reduced errors.

The system developed and used in the Oxford and Sheffield Regional Hospital Boards was then described. Site work had been rationalised. A light steel frame enabled the roof to be completed quickly so that work could proceed under cover; lorries could deliver components direct to the point of use, thus eliminating double handling. Erection and fitting techniques were studied so that fool-proof components could be designed. A typical £200,000 job had been built quicker than the national average at the same cost, incidentally reducing exposure to price increases. Because this was a client-based system every building procedure could be cost analysed and the cost effectiveness of the design refined. The intention was to produce as quickly as possible closed conditions for building so that, as in a factory, time and labour were under control. Buildings were planned to the dimensional discipline of a grid, and the benefits of machine technology were sought wherever possible. There was a constant feed-back of experience and consequent development of the system.

The essential difference between contractor and client-based systems was that the contractor's legitimate objective was to make a profit, whereas the client was concerned with performance. Because the market for clinical buildings was too small to justify the development of a commercial system, systems developed for other purposes were adapted by the contractors for the hospital field. Adapted systems were seldom as good as those designed for the purpose.

In order to realise the full benefits of system building, the larger the programme the better, bearing in mind the point at which batch production gave way to continuous production. This being so, an open system was to be preferred because it could use interchangeable components from other fields. This would become more obvious with the change to metric; wider European competition would bring longer production runs and keener prices.

Mr. I. G. Plenderleath, a partner with the firm of architects, Messrs. Baxter, Clark & Paul, who were commissioned four years ago to design a new 100-bed maternity hospital at Paisley, spoke of his experience of building with a contractor-based system. This was to be an extension of the Ministry of Health's comparative assessment of similar projects in England, and the contractors accepted this element of competition in arriving at the negotiated contract for a system building. The building was to be designed to the nationally agreed dimensional modules (D.C.I.) and the price contained within the relevant Building Note cost limits.

It was proposed to use the "Intergrid" system deveolped by Messrs. Gilbert Ash Ltd. Mr. Plenderleath approached his first experience of the system with some fears that the discipline of the system might impose undesirable restrictions on the architectural quality of the building, but he welcomed this major hospital commission as an opportunity to investigate what might prove a more rational approach to expenditure on health service building than the one-off, custom-built hospital.

Intergrid originated in 1951 when the Ministry of Education was investigating industrialised building methods for schools. A firm of structural engineers, the Prestressed Concrete Co., collaborated with Messrs. Gilbert Ash in developing the first version of Intergrid which was based upon a 3′–4″ planning grid. Beginning with 3′–4″ precast concrete sections post-tensioned to form beams, the system was steadily developed using beams and columns with fairly large pre-cast reinforced concrete floor units. Mark 4 was developed for the 2′–8″ planning grid which the Ministry of Health was then advising for hospital work, and it was this version which was used for the West Middlesex Hospital (architects, Robert Matthew, Johnson Marshall & Partners). Lying under the approach to London Airport, this hospital was a sealed, air-conditioned, deep plan "racetrack" building, using load bearing precast external wall units.

Paisley used an adaptation of this Mark 4 Intergrid, employing the currently preferred 2′–0″ planning grid. Cost limits restricted the structure to a simple frame design, using preferred spans of 22′–0″ (10′–0″ and 12′–0″ spans in the core) with 22′–0″ perimeter boundary beams permitting uninterrupted window areas. The spans in the other direction were also very simple, being 28′–0″, 28′–0″ and 28′–0″. The architects had found the system sufficiently flexible to allow reasonable planning freedom, and Paisley had a family resemblance to the Falkirk Ward Unit and the Bellshill light-well plan, with two 25-bed units on either side of an administration and circulation core.

Mr. Plenderleath then noted some points from his experience at Paisley.

Services

At West Middlesex the high velocity dual duct system had largely fitted into the voids in the beam webs, but in general the low velocity larger trunks used at Paisley would not. Fortunately it had been possible for the engineers to design a system using the racetrack corridors as main routes where the ceilings could drop to 8′–0″, thus allowing trunking to hang under the primary beams. Branch ducts into rooms could easily be accommodated between these beams. Other services were accommodated without difficulty in the depth of the beams and the 80 per cent holability in the floor slabs gave reasonable freedom for the plan location of services.

Elevational considerations

Elevational treatment was not dictated by any technical imitations of the system. Neither the earlier infill precast concrete cladding panels nor the load bearing wall units used at West Middle-

sex were practicable within the cost limits set for Paisley, and brick cladding was used. While a precast technique would have been more expressive of industrialised building, brick cost less at that point of time—and had at any rate weather-proof qualities proven in Scottish conditions.

Management

There was more to the system than its hardware, and the architects were impressed by the substantial contribution in terms of expertise and enthusiasm by the team of builders and engineers.

Mr. Plenderleath's experience suggested that the architect had little to fear and a lot to gain by using a system which offered a disciplined framework with most of the "wrinkles" ironed out. The system was no magic formula for building without tears, but it was constantly being developed and the next stage, Mark 5, would be metric.

Mr. J. Jarvis, Senior Engineer, Scottish Development Department, favoured the use of system building for hospitals as a means of overcoming the building industry's productivity difficulties. This had been demonstrated successfully in many other fields. Before discussing the special problems which faced the services engineer when presented with a system built structure, the importance of planning continuous programmes was stressed. This had to be coupled with efficient organisation, and the question posed was whether the fragmented organisation of hospital building in Scotland was geared to mount a sufficiently comprehensive programme.

Mr. Jarvis made a plea for the current re-appraisal of the Health Service organisation to take account of the functions of architects and engineers as well as hospital administrators, medical and nursing staff. The reason for an engineer's concern in these matters was that with a continuous programme of system building it should be possible to develop a more systematic approach to the provision of engineering services than was practicable with the one-off building, whether system or traditional.

System building did not alter the amount of engineering services required since these related to constant functional requirements, but it might alter their disposition. In a highly serviced complex such as a hospital, space must be available for the services, and, in order to ensure this, full consultation with the engineer was required at the outset of structural and design considerations. All this was true of any project, but a planned programme offered the engineer the chance to realise the potential of mass production and repetition. This implied a degree of standardisation in layout and construction. Differing site conditions might defeat the development of standard hospitals (which might otherwise be a fundamentally sound concept) but it ought to be possible to standardise certain departments within hospitals.

If, for example, a standard ward unit gained the blessing of the medical and nurse planners, substantial benefits might follow. In traditional building there was little standardisation of components, and dimensional tolerances were fairly large. Consequently engineering services had to be individually tailored to fit, and contractors could confidently anticipate installation difficulties not apparent before work started on the site. The likelihood of unpredicted snags, christened by Mr Jarvis "the bamboozlement factor", understandably caused contractors to price high to cover themselves.

Repetition of a standard system-built ward unit would probably eliminate this factor. The relatively small dimensional tolerances of industrialised building would facilitate the preparation of a standard design of the services within the unit, detailed to the last nut and bolt. With detailed and accurately dimensioned working drawings of services, exact bills of quantities could be produced which would benefit greatly both contractor and client. It would facilitate off-site pre-fabrication of services with substantial reduction in expensive installation costs. This was not star gazing. These principles worked in other fields and there was no reason why they should not apply to standard departments in hospitals.

Mr. J. W. Parsons, Superintending Architect, Research and Development, Ministry of Public Building and Works, spoke of contractual relationships in system building with particular reference to experience with his Ministry's NENK system. Mr. Parsons drew a series of analogies to show that a programme of system building involved direct contracts and implied sub-contracts, nominated contractors in certain instances, and forecasts as to the development of the programme. With different people responsible in some cases for the design of the system, the management of the building programme, the individual project design, the manufacture of components, and the erection—which constituted a number of parallel activities—it was important to define who was committed to what and when. A contract implied an accepted offer of service for a consideration but, in the complicated circumstances of client-based system building programmes, the component manufacturer might have to commit himself to production before an individual contract could be signed. In this case the client's "order to proceed" implied commitment in advance of a signed contract.

Mr. Parsons then spoke of the management tools employed in a large programme of system building. Standard components and assemblies were a basic feature of system building, and in some cases components were put out to tender on the basis of a performance specification. It was desirable for the building contractor to be given two to three months' notice of the actual contract, and he could be selected without waste of effort by using representative bills of key components. Cost control was more precise with a client-based system as *all* the detailed information was known. This meant that costing could be more accurate at the start of a job, and cost estimates could include a smaller float. There had to be clear arrangements in the programme, however, for adjustments for up-dating. With the NENK system it had been found helpful to appoint a project manager who was not necessarily the architect. Feed-back was the life blood of progress, and it was essential to be systematic in recording information as the system was developed.

Mr. Parsons then referred to some examples of NENK buildings, and suggested that the record showed both design work and building which was good and fast. He noted in passing that some job architects disliked the extensive coding associated with the use of standard components and assemblies. He also stressed that the limits of responsibility must be clear, for example where non-system work

was involved on a sloping site. In general, rigidly defined relationships were giving way to more flexible ones, but responsibilities must be clear in collaborations by system designers, manufacturers and project designers.

DISCUSSION

Introducing the discussion, **Mr. A. R. H. Bott,** Senior Architect, Scottish Hospital Centre, commented that any building, system or otherwise, must satisfy the users' functional requirements, and be proof against a sometimes inhospitable climate. Hospitals should be buildings of quality, and be designed to high aesthetic standards. He suggested that the papers presented during the morning all pointed to the need for a considerable serial programme in order to realise the full production and development benefits. This had been demonstrated in schools and housing. Applied to the hospital field, it was for consideration whether it was appropriate to whole hospitals or to standard departments. The prospect of engineering services designed in full detail in system building was to be welcomed.

This conference was timely because:—

(*a*) With the present programme fully committed there was an opportunity to judge the place of systems in hospitals in time to affect projects scheduled for the 1970s.

(*b*) The change to metric and accompanying rationalisation of components coincided with an increasing willingness in the hospital service to accept well founded standard solutions to more clearly understood functional requirements, and

(*c*) current pressures towards integration of the three arms of the health service *could* encourage greater co-ordination in the provision as well as in the use of hospitals and other health buildings.

Mr. Bott concluded by asking whether the time had come for the five Scottish Regions collectively or the Central Department to initiate a comprehensive assessment of how to tackle the next phase of the hospital building programme.

The ensuing discussion ranged widely over system building and current problems in the hospital field.

The principal points which emerged were:—

1. **Definitions**

   A distinction was made between industrialised building (factory-made components with widespread application) and complete system buildings (sometimes a complete kit of parts as in schools, and sometimes complete shells as in houses). Both the Ministry of Health and the Scottish Development Department were encouraging the use of components produced on a national scale; their experience was that, while maintaining quality, their prices could only occasionally be under-cut where there were abnormal transport costs by local small batch production. By contrast it was suggested that an open system was no system, and that components could only be fitted with certainty within a complete building system.

2. **Is there a problem?**

   The view was expressed that hospitals were at present being built by traditional methods as flexibly, cheaply and quickly as by industrialised methods, and to higher standards. Moreover any sense of urgency was not encouraged by arbitrarily imposed delays in the programme. This view was contested; widespread man-power shortages were quoted, and the fact that time-tables regularly slipped with few major contracts living up to progress estimates. It was suggested that this was exactly the kind of dilemma which called for a systematic solution.

3. **Building performance**

   The Ministry of Health had found difficulty in establishing criteria for a comparative assessment of contractor-based systems. Contractors who had built hospitals with their systems had demonstrated various degrees of commitment, and the only general conclusions from the exercise related to managerial expertise.

4. **Engineering**

   The high engineering content of hospitals appeared to invalidate many existing systems. Stress was laid on the importance of early consultation regarding services so that at any rate the *services* could be planned systematically. This was countered by the suggestion that an inadequate engineering fee scale was the real disincentive to detailed design. The importance was noted of appointing the M and E contractor early, just as with the builder.

5. **Permanence**

   The merits of relatively short-term "disposable" buildings were mentioned. The general view was that complicated buildings with elaborate services were not easily "disposable". While accepting that to design for convenient alteration was expensive, it was suggested that a well designed shell could accommodate itself to reasonable development and change in use. The record showed that Scottish hospitals were required to last 100 years.

6. **Building programmes**

   There was some discussion on the size of building programme necessary to make system building viable. For some production purposes one large hospital might be considered large enough in itself, but there was no doubt that component manufacturers needed large programmes to justify manufacture to tight tolerances. There were organisational difficulties in grouping contracts which might exceed those facing the authorities who had formed education and housing consortia. Component manufacturers were unwilling to commit more than half their capacity to systems, and there was pressure to develop components on a broader basis, interchangeable with housing, education, etc. There was also pressure with sound precedent for developing complete purpose-designed systems where there was a specific need. If such a need was identified and a programme gathered together to justify a system solution, economy in design and building effort might be associated with speedy erection of buildings well suited to their purpose.

THE CONFUSED ELDERLY

The importance of this group of patients and the particular implications in liaison between specialties formed the background to the presentation and discussion of this subject.

Dr. A. K. M. Macrae, Physician Superintendent, Bangour Hospital, Broxburn, took the Chair.

Dr. H. Craigie, Principal Medical Officer, Scottish Home and Health Department, introduced the subject and drew attention to three fundamental questions—the definition of terms, the size of the problem and the way in which it might be met.

Various age bands had been suggested in relation to different definitions, but for statistical purposes, it appeared that being elderly started at the age of sixty-five. "The Confused Elderly" was not a precisely defined group and to be both "elderly" and "confused" added many diagnostic refinements. That "confusion" was a "mixing up of the mind" might suffice as an initial definition for the purposes of discussion, though more could frequently be learned from a description of a confused and elderly person's behaviour than from any attempt to devise a comprehensive definition of it. Admirable clinical descriptions had been provided by geriatricians and psychiatrists and an account of a confused elderly woman in an essay entitled "Red Flowers" in a recent *Scotsman* competition was remarkable in its perception and compassion. Almost ninety years ago Robert Louis Stevenson gave not only a striking picture of an old and confused woman observed in a country church in France during his Inland Voyage, but also revealed an impression of apprehension and even of revulsion. Descriptions of the "confused elderly" tended to be coloured by personal fear of the physical and mental manifestations. Some impatience and perhaps intolerance might stem from a wish to keep distressing things out of mind and out of sight for personal reasons and from uncertainty of what best to do.

Even in Robert Louis Stevenson's day, the number of confused elderly people was becoming a source of anxiety. In a report on Gartnavel Royal Hospital, Glasgow, it was noted that 10 per cent of the resident patients and 8 per cent of admissions were aged over 65 years in 1889. The average age in Great Britain has doubled in 150 years and the average life span has increased since 1900 from 45 to 73 years. In 1900, one in 21 of the population was aged 65 years or over; in 1963 this figure had risen to 1 in 8; by 1980 it has been predicted that this will rise to 1 in 7. There were, however, variations in the percentage of the population over 65 years of age in different areas, e.g. 10·3 per cent in the Western Region and 13·4 per cent in the Northern.

It was clear that a high proportion of old people were afflicted not only by physical ill health but also by mental disability and/or social disability. One report stated that for the group 65 to 74 years, 3·4 men and 4·4 women per thousand of the population required in-patient accommodation for mental illness. Over 75 years, the figures were 4·5 and 5·2 per thousand respectively. Many patients with psychiatric illness, however, were not admitted to hospital or other forms of residential care and, indeed, the boundaries of normality were difficult to draw. It was not easy to define where symptoms such as forgetfulness, garrulousness, suspiciousness, and eccentricity became pathological. A study of 261 general practices suggested that the incidence of mental illness in those over 65 years was at least three times as high as the admission rate to hospitals. Of patients resident in Scottish mental hospitals at the end of 1967, 30 per cent of the men and 50 per cent of the women were elderly; and of the admissions during 1967, one-seventh of the men and one quarter of the females were in this category.

In the North-Eastern Region it has been shown that the percentage of elderly people in mental hospitals increased from 40·2 per cent in 1964 to 43·6 per cent in 1966; an increase in actual numbers of 12 per cent. It was not numbers alone but the need of many for special nursing attention together with their incapacity for self-care associated with their physical frailty which presented particular problems. Although 97 per cent of the aged population lived at home as against 3 per cent in hospitals or institutions, even a fractional increase in the latter percentage could overload the hospital service. Important questions were—who should treat the confused elderly and where? Should they be cared for in their own homes or placed under some other form of community care or admitted to hospital? If so, to what type of hospital?

Smaller houses and smaller families might contribute to a setting in which the elderly were less welcome, even if reasonably clear in mind, but this might not be truly representative of the attitude of many families today. It seemed unlikely that human nature had changed so much. The large families of the past did not in themselves ensure that old people would receive kindness, tolerance and good care and for most in the latter part of the twentieth century, housing conditions were worse and sanitation rudimentary. Some proclaimed the indifference of the present generation for the welfare of their elderly relatives and while it has been known for many years that "the constant presence of a mentally ill person in a small house . . . can exhaust and impair the bodily and mental health of every member of the family"; others pointed to the fact that the majority of sons, daughters, nephews and nieces devoted themselves to the care of dependants. Indifference or neglect was on the part of a few. It had also been noted that present-day society was not so much abnormally aged but that Victorian society was unhealthily youthful. The burden of dependency was in fact less in 1961 than in 1861.

There were, of course, many anxieties in relation to isolated, lonely old people and from the increasing number suffering from a multiplicity of mental and physical as well as social disabilities. Recent publications stressed different aspects of the social reaction to this problem. One administrative advance within the last few years where an elderly patient required to be sent to a mental hospital was that under the Mental Health (Scotland) Act of 1960 voluntary admission did not require the personal signature of the patient. Admission could thus be undertaken with the minimum of formality.

Dr. Craigie noted that in recent years geriatric medicine had developed as a new specialty and wondered whether there should be a parallel move

in the field of psychiatry. The mental hospital had a traditional role in caring for the confused elderly patient unlike most general hospitals which, along with welfare homes and eventide homes, have been reluctant to admit "mental cases". A need appeared to exist for special purpose hostels to care for mildly confused, odd and eccentric people. There was no doubt, however, that the problem of elderly patients with multiple mental and physical pathology was one of high priority; the solution was urgent because of its importance throughout the health service. It was encouraging that geriatricians and psychiatrists were meeting to review and discuss their mutual difficulties. The Standing Medical Advisory Committee had set up a Sub-committee to examine aspects of the problem and a Sub-committee of the Scottish division of the Royal Medico Psychological Association had recently conducted a survey in all mental hospitals in Scotland.

Dr. R. A. Robinson, Consultant Psychiatrist, Crichton Royal Hospital, Dumfries, also referred to the problem of definition. The term "confused elderly" conveyed different meanings to different people. "Confusion" had been defined as "a mental state in which reactions to environmental stimuli were inappropriate; a state in which the person is bewildered or perplexed or unable to orientate himself". A definition of this kind could encompass almost every mental illness and, also, some non-pathological reactions to stress. "Confusion" was a descriptive or symptomatic term, not a diagnosis. It stood in a similar relationship to the brain as did dyspnoea to the lung. It would be as unscientific and impractical to seek one specific prescription or disposal for the confused as it would be for the breathless patient.

The concept of "misplacement" of psycho-geriatric patients was of fairly recent origin. It became manifest only when services had reached a certain degree of sophistication and it might possibly have already lost something of its urgency as awareness of a problem did much to decrease its incidence. In 1962 it was noted that almost 24 per cent of elderly admissions were probably incorrectly placed in a mental hospital and 34 per cent in a geriatric hospital. In 1968 a recent paper gave comparable figures as only 15 per cent and 8 per cent respectively. The excess mortality rates associated with misplacement, which had been demonstrated six years earlier, could not be confirmed except in a small sub-group of eight patients of whom all but one died of causes which would have proved fatal whatever their location. Even 15 per cent multiplied nationally and internationally was a formidable total of "physical" patients misplaced in psychiatric units.

Investigators agreed on the frequent association of physical and mental illness in the elderly. One series in the South-West of Scotland (1963) indicated that 40 per cent of patients admitted to a geriatric unit had significant mental illness; 50 per cent admitted to a psychiatric unit had a significant physical illness. Comparable figures were 58 per cent and 28 per cent in Belfast, 30 per cent and 52 per cent in North London. These proportions did not necessarily confirm "misplacement" as a strict demarcation was not possible. Inappropriate placing was more obvious when services were organised in separate medical and psychiatric streams. Such patients required both medical and psychiatric assessment wherever they might be located. The availability of appropriate resources and not the designation of the unit determined whether or not a patient was correctly placed.

The initial screening of medical geriatric patients had become more intensive in recent years and the number and scope of routine investigations had steadily increased. There had been no comparable development on the psychiatric side. Over the last ten years the total population of Scottish mental hospitals has hardly altered while the admission rates for elderly patients to these hospitals had gradually increased. At the Crichton Royal, Dumfries, annual admissions of patients of 65 years and over increased by more than 250 per cent in this period. The proportion of elderly people admitted increased threefold—from 7 per cent to 21 per cent of the total. Almost half the resident population of the hospital was now 65 per cent and over. These figures were representative of similar institutions in Britain and there were indications that these trends will continue.

The ward units in which these patients may have to be nursed were quite unsuitable for the special needs of the elderly. The nurses seldom had specialised training in modern geriatric methods and the doctors were sometimes not fully aware of the advancing standards of geriatric medical investigations and treatment. Thus the mental hospital service was being asked to undertake responsibilities for which it was not designed. The psychiatric revolution has resulted in developments inimical to the needs of the sick-elderly—drug activation techniques, industrial therapy, behaviour therapy, patient government and a more dynamic atmosphere might indeed be threatened by the lower tempo of the geriatric ward. There was also a danger that the elderly psychiatric patient would not attract a high priority and that he might be associated with low morale and poor standards of investigation and treatment. The response to the recent Royal Medico Psychological Association's questionnaire showed serious concern on the part of psychiatrists about this situation and their desire to improve it.

The referring doctor was also faced with problems. It had been noted that "elderly patients tended to flow into any vacant bed, irrespective of administrative edict and were usually labelled selectively from their multiple pathology with the diagnosis best calculated to gain admission to a particular hospital". Acutely disturbed behaviour was, of course, difficult to contain in a medical or geriatric ward and for such patients many contemporary investigations were impossible as they required active co-operation. External pressures tending to direct the patient into the psychiatric stream would not in themselves be critical if continuity of medical advice could be assured. Too often, however, units were apart both geographically and ideologically. Again, the conviction remained in many minds that mental illness in the aged held a universally bad prognosis.

Dr. Robinson reviewed the nature of the risk to the misplaced patient stressing that depression was often the presenting system and might precede radiological or other clinical evidence of neoplasm. Iatrogenic causes of mental symptoms were not infrequent. Injudicious use of tranquilising and sedative drugs was the commonest example and was particularly dangerous as the side effects were often undramatic and indistinguishable from the signs of advancing senility. Digitalis, though valuable, could occasionally produce a confusional state even on minimal dosage. One report noted that 40 per cent of hospital

cases of hypokalaemia were induced iatrogenically. Occasionally severe depression would respond to the correction of potassium depletion without specific psychiatric therapy. The physical basis of many confusional states was well recognised but with increasing availability of specialised diagnostic techniques, evidence was accumulating that some forms of deficiency or depletion were more common than had been realised.

A consecutive series of fifteen routine admissions to a psychiatric/geriatric assessment unit showed that 16 per cent of patients had vitamin B.12 levels below 130 micro-micrograms/ml. and 30 per cent had folic acid levels below 3 milli-micrograms/ml.; 44 per cent of the admissions had either single or combined deficiencies. None of these deficiencies was obviously related to physical state or dietary deficiency though all were reflected in the peripheral blood picture by macrocytosis or hypersegmentation of neutrophils. Deficiencies were found equally in all three diagnostic groups—functional, toxic, confusional and organic and there was no correlation of age. In a control series of twenty residents in an old folks' home, comparable deficiencies were found in only 10 per cent of cases. In this group the only example of B.12 deficiency was a patient who had been under psychiatric care two years earlier. It was not possible to prove that the revealed deficiencies were causally related to psychiatric illness though the findings suggested that the presence of such abnormalities was likely to be associated with admission to mental hospitals and that early discharge was related to absence of deficiency. The association of such deficiencies with mental symptoms was of course well-known.

In the hospital group 75 per cent of those with raised neutrophil hypersegmentation counts were found to have deficiencies; this was a point of practical interest and suggested that hypersegmentation might serve as a useful screening test in elderly psychiatric patients. The test gave some false positives but no false negatives.

Dr. Robinson discussed the importance of malabsorption as the direct precipitant of mental symptoms and illustrated this with examples in which a man of 65 and a lady of 72 responded satisfactorily to replacement therapy and a patient who illustrated the obverse of the situation, i.e. with physical symptoms which required intensive psychiatric treatment along with the appropriate medical measures before recovery was achieved. Such patients illustrated the need for close collaboration between specialists in different fields if diagnostic and therapeutic difficulties were to be resolved. While such patients might represent only a small proportion of normal practice, it was from these that knowledge might be most quickly advanced.

It was clear that only the active and practical co-operation of physicians and psychiatrists could promote the exchange and cross-fertilisation of ideas which the solution of these mutual problems urgently demanded.

Dr. J. H. Henderson, Consultant Psychiatrist, Bilbohall Hospital, Elgin, considered that the "confused elderly" could be divided into categories according to the degree of and reasons for their disorder. The spectrum of illness and disorder ranged from the recent onset of confusion in an acute infective illness to a chronic progressively deteriorating senile dementia. The problem in brief was how to plan for these old, infirm, people and ensure respect for their persons and their personalities.

National norms of so many beds for the elderly population at risk were too facile a formula and represented "planning" by those too remote from the problem to be directly involved. Accepting that the problems of the care of the confused elderly were determined by many factors, including the interrelation of biological, psychological and cultural elements, the variables in particular localities deserved single and particular attention. There was a marked difference between Kensington, Kilmarnock and Kinloss. Local decision was required based on local conditions and it was noted that beds per se were not the whole answer. It was the use of beds which mattered, better deployment of resources, better management, unification of the service and the influence of clinical administration.

Certain principles could be enunciated to avoid misuse, abuse and even disuse of available beds and resources for the confused elderly:—

1. No decision should be taken before assessment: the principle of NODBA, Dr. Henderson suggested. This required either assessment at the patient's home or beds for this purpose.
2. Confusional states, disorientation, delusions, etc. were aggravated by age and should not imply an instant declaration of "mental illness".
3. The majority of confusional states were a direct result of organic disease or materially aggravated by physical factors.
4. A distinction should be drawn between illnesses due to the ageing process and those illnesses occurring in old age.
5. Early warning signs should be recognised and if acted upon would ensure early detection of infirmity, a sine qua non of geriatric practice.
6. The contribution of medicine to the solution of the problem was only one part of many composing the instrument of social welfare. The whole was greater than the sum of the parts.

Against these principles, the accommodation needs were reviewed. They included an assessment unit in hospital, the acceptance of progressive patient-care from the areas of dependence to independence, the use of alernatives to in-patient care—day care, night care, out-patient services, and the provision of welfare homes either in the form of ordinary Part 3 accommodation, units for the frail ambulant or special units for the mentally infirm.

Assessment units must have access to all medical, diagnostic and investigation services and were therefore truly general hospital based. The site and function were determined by medical needs. In the sequence of progressive care leading to self-care or to long-term care, the facilities and services should be related primarily to nursing rather than to medical requirements. Long stay accommodation of the confused elderly was clearly a responsibility of the psychiatrist service.

Planning these services and deciding priorities for this group of patients would be influenced by a number of factors:—

1. This proportion of a comprehensive and active community-based mental health service composed more than 50 per cent of the residents.

2. Expectancy of stay (life) was from two to five years on average.
3. Admission figures were rising and would continue to do so in proportion to the increasing size of the population.
4. Available staff was limited in all categories—domestics, nurses and doctors.
5. Resources for development were also limited thus cost-effectiveness was imperative. In addition to these objective factors, subjective points were that:—
   (*a*) The distinction of the mental hospital lay not in curing the curable but in the provision of mentally stimulating and encouraging care for the incurable.
   (*b*) Facilities, services, furnishings, medical care and personal contact all add up to ambience and this more than anything else determined the use and acceptance of accommodation by patients, relatives, the community, and also by the nursing, domestic and medical staff.

The accommodation needs for the confused elderly included:

1. **An assessment/intensive care area**
   This must allow excellent nursing services and the necessary working rooms, observation facilities, selection of suitable types of bed, well-designed toilet accommodation, multi-purpose bath/showers, non-slip flooring, well considered lighting—particularly night lighting. A ground floor location was helpful, security was important and many aids were available and should be provided—banisters, handles, grab rails, etc.

2. **Progressive patient care accommodation**
   Bed areas of 1, 2, 4, 5 or 6 beds but not more. Accommodation for the needs of the individual patient—lockers, wardrobes, etc., multiple sitting areas, good dining facilities, recreation and activity areas and rooms for television, films and visitors.
   Activity provided an aim and helped to give a feeling of responsibility; it strengthened self-confidence and channelled the patient's restlessness along well ordered lines; it created necessary inhibitions and protected the patient from relapsing into one of his own moods.

3. **Hostels**
   The case for hostels as an extension of hospital facilities should be examined. These may be less elaborate yet include good facilities for staff and patients.

4. **Community care**
   Outlets from hospital were most important and in developing this aspect it was necessary to obtain factual information. There was much overcrowding and poor "ambience" in the existing community. Liaison with the community and an improvement in general public relations were of the greatest importance.

Dr. Henderson outlined the work of a sub-committee of the Scottish division of the Royal Medico Psychological Association (RMPA) of which he was the convener. Survey work was being undertaken and a report would be prepared. The sub-committee was examining many aspects of the problem including a statistical and factual analysis from over 30 psychiatric units, a review of the organisation of services both in hospitals and in the community, questions of staffing, criteria of admission, links between the psychiatric and geriatric service and alternatives to traditional areas of care.

Dr. J. Williamson, Consultant in Geriatric Medicine, Eastern General Hospital, Edinburgh, outlined the factors surrounding the elderly patient suffering from confusion. He noted in particular their need for reassurance and help and the way in which external stimuli might be misinterpreted. Otherwise innocuous auditory stimuli might be distorted; patients might become agitated, anxious and even terror stricken and violent. Their condition might involve elaborate delusions and hallucinations. The patient's mental condition might range from a mild degree of disorientation to a severe psychotic picture. The condition was frequently complicated by physical illness with pain, often in the knees and hips, breathlessness of cardiac or pulmonary origin—which got worse with the state of agitation—stiffness, imbalance and a liability to fall. The condition might be affected by the use of drugs, especially barbiturates.

The relatives of many patients struggled on in adverse circumstances though in some cases also elderly, and physically unable to provide continuing support. They, too, were subjected to mental distress; there was a fear of the "lunatic" and of alienation; they might feel a sense of shame and conceal a situation in which a patient might require to be moved to an institution. Again, relatives were affected by the difficulties they had in dealing with a variety of agencies. The general practitioner, the local authority, the psychiatrist, the geriatrician all appear to have some limitation to the contribution they could make. This increased the relatives' worry; they saw no end to the problem and this affected their reactions.

Dr. Williamson considered it was wrong to "knock" the younger generation in relation to the discharge of their responsibilities. Examples of filial impiety had been documented over thousands of years. At the same time, notable changes were occurring in the pattern of living. Small houses, the distance factor, the inability to "drop in" throughout the day, were important elements in this change. Again, there were indications that some old people themselves did not want to live with a son or a daughter-in-law and in this they too might be exhibiting a change in attitude.

Outlining the organisation which had been built up in his area, the following features were noted:—
1. Senior medical staff made themselves available at short notice to general practitioners who contacted them by telephone, by letter or by a visit. This required a reservation of time on the part of the senior staff but this type of contact was of primary importance.
2. "At risk" groups were gathered for investigation. In this way some of the "confused elderly" category might be identified and assisted at an early stage.
3. Health visitors were most useful in visiting patients who lived alone, who had become bereaved or socially deprived. They made reports and arrangements were made for patients to be seen at "consultative clinics".

Dr. Williamson agreed that decisions should not be taken in advance of assessments and stressed the importance of a good "history". This was time-consuming, it might involve a search for relatives and a significant range of enquiries in the area in which the patient lived.

Experience has shown that for over 70 per cent of such patients a positive recommendation could be made in relation to the appropriate social, psychological or medical action which could be taken. Of such patients, 40 per cent had depression which responded to treatment. Other common conditions were cardiovascular failure, anaemia, thyroid problems and painful conditions of various types. Where a patient was confused it was important to differentiate between an acute brain syndrome, a chronic brain syndrome or an acute episode superimposed upon a chronic process.

There was a need to "jack up" domiciliary services to allow management of the confused elderly in their own homes if possible. The aim would be to bring a hospital level of care to the patient's home and enlist the help of the patient's relatives. If they were not helpful, this was frequently because they were puzzled, worried or ashamed. It was necessary to take time to explain the patient's illness to the relatives. It was important to manage the patient's fluid balance, to deal with elementary aspects such as bowel care, faecal impaction, and attend to bladder and skin.

The tempo of a routine hospital out-patient clinic was unsuitable for the confused elderly. Sessions should be arranged at separate times and staff must be attuned to the particular needs of these patients. If the patient had a true acute confusional state and had to be admitted to an institution this should preferably be a geriatric unit. This was probably also the case where a more chronic confusional condition existed. After a full assessment and in co-operation with psychiatrists, other arrangements might be necessary. If no remedial pathology was present, a welfare home would be considered. It was possible that in future, patients of this type might best be channelled via a common admission unit located in relation to geriatric accommodation. If such were available and assuming an improvement in housing for elderly people together with closer links with others working in this field, it should be possible to integrate the support and assistance which should be available to patients of this kind. It was necessary also to educate doctors in geriatric work; much now done by geriatricians could be done by general practitioners and there were encouraging instances in which family doctors were taking a more enlightened and knowledgeable attitude to this type of care. Much was now being done but much remained to be undertaken to mobilise and integrate the resources and to deal with old people in new ways.

Professor W. Ferguson Anderson, Professor of Geriatric Medicine, University of Glasgow, stressed that the method of dealing with the mixed, medical, social, psychiatric patient would loom large in any future planning for the care of the elderly in its widest sense. Those responsible for further development of our services for old people had a double duty. In the first place there was the need to ensure that everything possible was done in the best interest of our elderly patients. Facilities must be provided for correct diagnosis, appropriate treatment and, where possible, arrangements made to ensure their return home. Old people existed in this world of harsh reality and if they were muddled or confused they could not simply be ignored or abandoned. In one way or another all were veterans of two world wars and on that count alone deserved the best attention the nation could provide. The second duty to be faced was that of responsibility to the relatives and friends of elderly patients. When help was required for the confused or wandering in the older age group it was required immediately. Failure to give prompt assistance could result in the death of the patient on the one hand or the slow grinding into the ground of well disposed and loving relatives.

In this country the whole service for old people relied on the willingness of relatives to help and was based on the strength of their love and affection. At present in the United Kingdom, over 40 per cent of people over 67 years of age lived with their relatives; in the U.S.A. the figure was 28 per cent and in Sweden it was less than 10 per cent. If our plans did not now offer assistance to relatives when the call for help was received, and if the proportion now cared for by their relations was significantly reduced, a massive increase in hospital and local authority accommodation would surely be required.

Progress in the study of diseases of old people, especially as regards physical disease, had been encouraged by the development of the specialty of geriatric medicine. It seemed proper that a similar development should occur within the bounds of psychiatry where urgent attention was required for the mentally ill old person. There was a clear need for a further thorough assessment of the apparently senile elderly person and of more emphasis on this type of work in the training of undergraduates. Suitable accommodation for diagnosis, treatment and recovery were essential.

A retrospective study of a total of 98 patients referred to Foresthall Hospital under terms including "senile", revealed that two-thirds were over 80 years of age. In addition to the label "senile", there was a wide distribution of diagnoses in relation to the men but for the women most complaints were referred to the cardiovascular or central nervous systems. Fifty-four patients were regarded as "senile" only. It appeared that the connotation of senility was built up because of the patient's generally impaired physique, lack of social self-confidence and a deterioration in special senses. Fifteen of the 98 patients were "confused", seventeen were incontinent, seven were wandering and eight blind. Of the 98 patients referred, 75·5 per cent were admitted and an average of 3·19 lesions per patient found. These covered a wide range of conditions; six of the patients had cancer. Twenty-five of the patients died in hospital; half of the patients were discharged home. Of this group an outstanding feature was the small number found to be confused.

The psycho-geriatric unit was one where admission to hospital for complete assessment and diagnosis took place. The older patient admitted was the type who might slip between the services of the local authority, the geriatric unit and the mental hospital. It included confused elderly people who might wander and the patient who did not seem disturbed enough for admission to a mental hospital but was too disturbed and for too long a time for a geriatric unit and certainly could not be looked after in a local authority hostel. These people were ideally

suited for the combined attention of the psychiatrist and the physician in geriatric medicine. In many instances the patient might be able to go home from the assessment unit. A decision should be made rapidly, say within a month, as to the final placement of the patient whether in local authority hostel for the mentally frail, back home again, long-stay geriatric accommodation, or long-stay accommodation in a mental hospital. Misplacement tended to occur when bed shortage forced the doctor to place his patient in unsuitable accommodation, e.g. in a geriatric unit because no bed was available in a mental hospital. Borderline cases do occur and the diagnosis of senile dementia itself presents problems. If an older person has had a mild stroke, has become aphasic or dysphasic, it was difficult to interpret what was due to the neurological deficit and what to mental confusion. This was one area requiring further research and a combined attack by the physician and the psychiatrist. As in the geriatric assessment unit of a general hospital, the aim should be to reach a clear diagnosis. The common association between organic physical illness, such as hemiplegia, and affective illness such as depression must be remembered. A person with hemiplegia had three illnesses: paralysis which affected the body, the depression which affected the mind—this being the result of the realisation of being no longer a whole person—and fear related to the present, the future, the doctor and the hospital. Older people frequently worried excessively about what was going to happen to them.

Mental confusion in the elderly should be regarded as the convulsion or fit of the infant. It was just as important, the causes were just as numerous and in fact were often identical. Confusion originated from a change of surroundings associated with the diminished sensory intake of elderly persons. Eyes did not see so distinctly, hearing was dull, memory for recent events was poor, and the sequel of circumstances leading to the new scene was forgotten. The doctor, the nurse or the relative should always make sure that the old person understood who was present and to whom he or she was talking. The nurse should make herself known to the patient, identify herself clearly and tell the old person the truth about her whereabouts. This might have to be done many times in order to establish contact between the old person and a new situation.

Old people required to get into a protected group and be part of a "caring community". The health centre supported by geriatric physicians, psychiatrists, district nurses, health visitors, social workers, home-helps and voluntary organisations had much to offer in this respect. In the doubtful case for placement, joint consultation by psychiatrist and geriatric physician was important and could be helped by the informed general practitioner's background knowledge of the patient's habits and previous history. The worst possible situation was not to face the problem and to delay decision in the hope of spontaneous settling of the mental confusion. This could occur but it was wiser to attempt a diagnosis. A considerable proportion of patients with senile dementia could improve if taken in hand early enough and particularly in the case of so-called secondary dementia provoked by isolation, bereavement or by prolonged somatic disease.

Professor Anderson noted that in 1959 the World Health Organisation recommended an integrated mental health service for the elderly with geriatric guidance centres. Teaching of medical students and nurses should include instruction in the mental health problems of the ageing. Communities should be encouraged to show more favourable attitudes to the problems of the elderly and more research should be undertaken. It was now time to plan for the next twenty years, to initiate preventive measures and look at questions such as retirement policies, life in retirement, incentives for continuing part-time employment with perhaps realistic tax concessions to relatives who undertook care. In Sweden, for example, a daughter who gave up her work to care for her mother or father was given pay as a home-help based on her previous weekly wage. The future effects of automation in industry, the results of a shorter working week, and attempts to prolong the life of men in order to prevent mental illness among women were important considerations. The need to focus the spotlight of attention on this group of patients was so clear that it was difficult to understand any lack of enthusiasm for these projects. Visits to other countries indicated that the urgency of the need for suitably planned accommodation was more clearly appreciated. The level of knowledge of ageing people and the provision made for their care had wide and direct implications in social policies.

DISCUSSION

Dr. G. C. Timbury, Physician Superintendent, Gartnavel Hospital, Glasgow, opened the discussion. he considered that few would disagree with the need for overall planning, early assessment, the place of the health centre, the general practitioner, health visitors, social workers and voluntary agencies or with the general concept of psycho-geriatric units as grouped entities. Points of detail, however, required more examination. Whether all categories of patient should be admitted via an assessment unit was arguable and there was a need for more clarity concerning the provision of long-stay beds and the auspices under which they would be managed. The question of "outlets" was of particular importance. Problems of recruitment, training, morale of nursing staff and the relationship between these factors and the location of units required consideration. The quality and suitability of accommodation and equipment were also important.

Much still remained depressing for both patients and staff in the environment in which they worked. There was a need for a change in emphasis in the allocation of finance. Dr Timbury suggested a further acrmonym—NENHOB—no evasion of the need for hospital building.

In a subsequent discussion the main points to emerge were:—

1. **Assessment**

   There was general agreement of the need for assessment of confused elderly patients but a single channel for all categories of patient was not favoured. Certain types of elderly patient showed mental changes which could be dealt with either by the geriatric or psychiatric units and others would require admission direct to a mental hospital.

   It was stressed that any assessment unit should provide the necessary diagnostic facili-

ties. These and available staff were probably the main factors in determining the location of the unit, i.e. whether at a mental hospital, a general hospital or possibly on a separate site. Liaison between psychiatric and geriatric aspects and also with the local authority interests was important. Patients should not be admitted to Part 3 accommodation without first being medically assessed.

2. **Long-stay beds**

The effect of improved assessment and more emphasis on domiciliary care and rehabilitation on the number of long-stay beds was discussed. Where lives would be prolonged by these means the overall effects on the number of long-stay beds was difficult to anticipate. It seemed most unlikely, however, that a smaller number would be required. Much depended on progress in providing suitable housing and, if "frail ambulant" units were available, there was a probability of fewer readmissions to hospital beds. It was noted that whereas more people now reached the age of 65 years, the expectation of life thereafter was less than it was fifteen years ago. The possible projection of trends of this kind would affect future requirements but, in general, the need for an improvement in both the number and quality of long-stay beds was predicted.

3. **Local authority provision**

Schemes assuming the absorption of confused elderly patients up to a proportion of 20 per cent of the inmates of local authority homes were reported but it was considered unacceptable both from the points of view of patients and their relatives to mix confused and non-confused old people. Units for the confused elderly should be differently planned, staffed, decorated and run. Purpose-built units were considered to be a great advantage.

There was considerable discussion on the problem of the "compulsive wanderer". This group represented a difficult problem. It was undesirable to control such patients by sedatives and they were unsuited for admission to Part 3 accommodation. It was valuable for them to have space but they required satisfactory observation with a degree of physical control mainly for the patient's protection.

As regards local authority homes and other services, it was noted that the most striking feature of the contribution by different authorities was its variability. Some local authorities were said to make almost no contribution to the problems of the elderly. There was a great need to obtain some uniformity of service for the mentally and physically frail and the home-bound.

4. **Nursing staff**

Numerous references were made to the effect of nurse-training programmes and to the fact that the scarcest commodity was the trained psychiatric nurse. It was pointed out that the correct placement of patients in different types of accommodation and the provision of the appropriate category and grade of nurse involved forward planning; ad hoc arrangements were likely to prove unsatisfactory.

Concern was expressed by clinicians that student nurses were getting insufficient practical training in the problems of geriatric nursing and that this might be regarded as more suitable for pupils training for the Roll. From the nurses' point of view it was pointed out that the training syllabus allowed rotation of students to geriatric units. There was an overall problem of shortage of staff and misinterpretation of the syllabus might occur in local situations.

It was necessary for the hospital service as a whole to review the areas in which trained nursing staff were required. The optimum deployment of existing resources was made increasingly difficult if multiple units were set up particularly in relatively remote situations. Instances were quoted of psychiatric wards in general hospitals being staffed from a nearby mental hospital. This was said to be effective so far as the general hospital was concerned but meant that trained staff at the mental hospital was depleted. The hope was expressed that under the "Salmon" structure there would be a greater opportunity for nursing administration to weld units together from both the training and the routine staffing points of view.

5. **Liaison**

The need for clinical links between different specialties was stressed by several speakers. Consultants in psychiatry and in geriatric medicine must be accessible to each other for consultation. Combined ward rounds and outpatient clinic sessions were suggested as ways of improving the links between these specialties. Again, liaison between local authority staff, social service workers and general practitioners was of considerable importance. Positive efforts were needed if the necessary links between the various interests were to become meaningful in practice.

6. **Costs**

Difficulties were noted to stem from the fact that finance came on the one hand from the Exchequer and from local rates on the other. No powers existed to enforce particular standards of accommodation or levels of provision, e.g. as regards home-helps. It was suggested that greater co-ordination would be possible and a more uniform level of service attained if financial responsibility rested with the Central Department particularly in relation to capital developments.

October 1968

BLOOD TRANSFUSION

This increasingly important service and a wide range of the most recent developments were reviewed and discussed in considerable detail.

Mr. E. U. E. Elliott-Binns, Under-Secretary, Scottish Home and Health Department, took the Chair.

Dr. I. S. Macdonald, Senior Medical Officer, Scottish Home and Health Department, recalled that "transfusion" was not a new subject and illustrated this by a quotation from the Glasgow Herald, 1793:—

> "A French prisoner upon his parole of honour has been committed to Winchester gaol for sheep stealing. On examination, he proved to be a surgeon, and said he only meant to borrow the sheep to make an experiment of transfusion."

When the A.B.O. groups were identified transfusion became more practicable but it remained a somewhat heroic procedure until techniques of banking and storage were developed in the late 1930s and an organised service began to emerge. With a "generous grant" by the Secretary of State, this culminated in the formation of the Scottish National Blood Transfusion Association in 1940. The organisation had remained essentially unchanged. It was not affected by the advent of the National Health Service in 1948 except that the relationship with the Central Department was formalised and adjusted.

The five regional transfusion centres had an overall total of 365 full-time and 135 part-time staff. Four had full-time directors and there were scientific, medical and technical staff, organising secretaries and donor attendants. The Service retained its voluntary status although almost all its financial support was from the Exchequer. Its functions, in brief, were the collecting, processing, storing and distributing of blood and blood products.

There had been a remarkable growth in the Service. More than four times the amount of blood was collected than twenty years ago but the use of whole blood for patients treated in "acute" beds had risen more slowly; the difference between the amount collected and the amount used in this way represented the area of component therapy and a small but possibly inevitable element of wastage. The amount of blood collected per thousand of the population had increased approximately five times in the past twenty years. In 1968 it was slightly over 36 donations per thousand of the population. With existing methods of collection it was possible that there was a limit of about 50 per thousand. Exchequer grants now exceeded £500,000 and covered practically the total expenditure, the grants twenty years ago were approximately £50,000, with the total expenditure in proportion.

Dr. Macdonald referred briefly to the fact that while whole blood remained of primary importance, many developments were taking place in relation to blood products. These would continue and a large capital investment was involved. Areas of particular interest included processing methods, storage at low temperature, the isolation of further specific fractions, the use of new types of container, the effect of automation, the use of computers, the importance of donors, the assessment of future requirements and the problem of planning to meet changing needs.

Dr. R. A. Cumming, Regional Director, Edinburgh and South-East of Scotland Regional Blood Transfusion Service, spoke on the "economic use of blood" and stressed that financial economy was not necessarily the same as the economics of safe, efficient patient care with optimal utilisation of available resources.

The traditional image of the Transfusion Service was mainly or solely of the recruitment of donors, the collection, classification and distribution of blood, and the serology of blood groups. With the growing availability of blood, other and equally important functions had evolved; there was an increased knowledge of its properties, and greater ability to define clinical requirements and prepare appropriate remedies. The Transfusion Service must remain aware of the extent and nature of these requirements and should anticipate rather than follow clinical progress. Again, the Service should know whether or not the material it supplied was effective and safe; it should investigate the reasons for any failure or risk and participate with clinical departments in the development of new products and the more efficient use of blood. This entailed lines of communication which included the donor as a team member; this concept was important in relation to the economic use of blood.

Some wastage was inevitable and while an important cause might be an unrestricted supply, there were other and possibly less controversial aspects. These included:—

1. The necessity to maintain a basic reserve of whole blood for immediate distribution.
2. The need to maintain small amounts at many hospitals for infrequent emergencies.
3. Any imbalance in intake due to variations in donor response coupled with unexpected or unpredictable fluctuations in use.
4. Unnecessary transfusion.
5. The use of whole blood when a component would be suitable.
6. Defective storage conditions and administrative or organisational failure.
7. Excessive reservation or hoarding leading to immobilisation of supplies.

Loss or waste might be reduced in various ways. The essential features were:—

1. The balance between supply and demand and the maintenance of adequate donor panels. At least three kinds of panel could be identified—those necessary for the maintenance of basic stocks, emergency panels and "specific donors" for uncommon blood groups or "special properties" such as immunoglobulins. Based on six-monthly donations, the active panel of donors should be at least equal to the number of units of blood required annually. A realistic "donation rate" was approximately 50 per thousand of the population per annum.
2. The development of methods for long-term storage of labile or scarce components to allow stockpiling against irregular, heavy demands.

3. Education of both suppliers and users on many aspects of the clinical, technical and administrative handling and use of blood.

The essential purpose of using blood was to correct or restore the loss or deficiency of all or some of its component parts. It was not justifiable to use whole blood if a particular component was indicated clinically and blood components were assuming increased importance in modern blood transfusion practice. This required clear decisions on specific requirements, adequate supplies and the necessary organisational and financial support.

Dr. Cumming explained the interrelated pattern of full blood utilisation. This involved fresh blood, stored blood and products following cryoprecipitation and plasmapheresis. He did not consider that a policy of unrestricted production of all clinically applicable blood components should be adopted as the total requirement for each component was not yet known. The components varied in relative amount per unit volume, in their biological properties and physico-chemical characteristics. Again, the requirement for individual clinical conditions varied; some were seldom encountered, others were relatively frequent.

Some components were costly to prepare and rarely required. It would be unjustifiable to provide these in excess of need. "Component therapy" should therefore be regarded as optimal utilisation in terms of clinical efficiency, safety and economy. The problem of disproportion between availability and clinical requirement might be met by fractionating the proportion of available blood to the fullest possible extent. This might be implemented by using a highly selected group of donors already committed to "special requirements", e.g. in relation to immunoglobulins. This would also apply to components such as frozen red cells of uncommon types, platelets and lymphocytes as well as plasma components.

Dr. J. Wallace, Regional Director, Glasgow and West of Scotland Blood Transfusion Service, Law Hospital, spoke on human specific immunoglobulins. He noted that immunologically competent cells might react to foreign substances by producing antibodies against invaders. The foreign substances might be bacteria, viruses, drugs, donor red cells or transplanted organs. The specific antibodies could be helpful, harmful or neutral. The gamma globulin fraction of serum or plasma proteins showed the least mobility on electrophoresis, and it was this gamma globulin fraction which contained antibodies. By fractionating plasma or serum it was possible to prepare a gamma globulin which contained a concentrate of antibodies. During the past twenty years such preparations had been used in three principal ways—in the prophylaxis of certain viral diseases, in the prophylaxis and treatment of tetanus and other diseases to avoid the dangers of animal serum preparations, and in the treatment of antibody deficiency syndromes to prevent recurrent bacterial infections.

Changes were already taking place, as was seen by the introduction of safe and effective vaccines against measles and rubella. Similarly, in relation to tetanus, active immunisation by toxoid was preferable to passive protection by human gamma globulin. These modifications resulted in a reduced usage of human gamma globulin, but other developments would result in an increased demand. For example, the treatment of oligaemic shock in extensive burns by albumin rather than whole plasma made the patient deficient in gamma globulin. Since these patients were particularly liable to develop infections, it would be necessary to administer parenteral gamma globulin. Similarly, the introduction of specific products such as anti-D gamma globulin would increase usage.

Because of confusion over terminology, the World Health Organisation had recommended an international nomenclature.* The term gamma globulin referred to mobility in an electric field. Being concerned with immune antibodies, the recommended generic name was human immunoglobulin. When this was prepared from random pools of donor plasma, the product was called human normal immunoglobulin. On the other hand when a specific product was prepared, the term should be human immunoglobulin anti-X. For example, a preparation from the plasma of donors actively immunised against tetanus would be called human immunoglobulin anti-tetanus.

On an electrophoretic strip the gamma globular were seen as a diffuse band. In other words the immunoglobulins themselves had molecules which migrated at different rates. This heterogeneity of immunoglobulins had now been confirmed chemically, and at least five classes of immunoglobulins, IgG, IgM, IgA, IgD and IgE had been recognised. Two examples would show the practical importance of these complexities in blood transfusion work. Blood group antibodies were specific immunoglobulins and in order to detect some blood group antibodies it was therefore necessary to have specific reagents such as anti-IgG, anti-IgM and anti-IgA. These specific reagents could be prepared in regional transfusion centres or bought commercially. The second practical example concerned quality control in a blood products unit. It was necessary to prepare relatively pure fractions. The methods of separation were expensive, and elaborate tests must be performed to ensure the purity of these fractions.

At first sight the concept of specificity and of heterogeneity might appear contradictory, but on consideration it was possible to reconcile the two concepts as would be seen by referring to human immunoglobulin (IgG) and anti-Rh(D). This product was specific in the sense that it was human, it was an IgG immunoglobulin, and antibody molecules were specifically directed against the Rh(D) antigen of human red cells. On the other hand even the "pure" product might contain traces of immunoglobulins other than IgG. In addition it was only a minority of the antibody molecules in the product which would have the specificity anti-Rh(D). Most of these antibody molecules would be directed against other antigens.

This human specific immunoglobulin anti-Rh(D) was now used to prevent the immunisation of Rh(D) negative primigravid women, and this development raised practical implications at laboratory, clinical and administrative levels. The Rh negative mother was immunised by the Rh(D) positive ABO compatible red cells of her own infant. It was possible to destroy these foetal red cells in the mother's circulation by injecting the mother with anti-D immunoglobulin within 36 hours of delivery. Before

* World Health Organisation. *The use of human immunoglobulin: report of a WHO expert committee.* Geneva, WHO, 1966. 3/6d. (Technical report ser., 327.)

applying this preventive measure in routine clinical practice, it was most important to establish by experiment and clinical trial that the method was safe and effective. This had been done by workers in the United Kingdom and in the United States, during the past eight years, and since 1st March 1968, the Scottish Home and Health Department had recommended the use of anti-D immunoglobulin in selected maternity hospitals nominated by Regional Hospital Boards.

The only source of anti-D immunoglobulin at present was the donation of plasma from Rh negative mothers already immunised in pregnancy. The amount was limited and it was therefore necessary to control the use of anti-D immunoglobulin. The clinical trials were astonishingly successful, but it was most important to maintain detailed records of the general use of anti-D immunoglobulin. The results should be surveyed and apparent failures to prevent immunisation should be investigated. For example, in the Western Region, to date, 100 mothers who received an injection had been investigated six months post-partum. Two of these primiparous women appeared to have been actively immunised against the Rh(D) antigen in spite of having received anti-D immunoglobulin. The evidence available suggested that these two women were already immunised at the time of delivery, and need not have been given the injection.

The prevention of immunisation would result in a gradual but steady decrease in supplies of anti-D plasma. The alternative source was to immunise Rh negative male volunteers, or post-menopausal Rh negative female volunteers. The injection of donor red cells to these volunteers was not free from risk, and in particular there was the danger of transmitting serum hepatitis. New ethical and legal problems were therefore raised by this development. In addition, plasmapheresis will be being performed on these immunised volunteers, and although this was considered a safe procedure, no-one was certain about the long-term effects. These donors were therefore in a special category from these aspects, and also from the fact that they were being asked to spend perhaps two hours once a month at a regional transfusion centre.

What has been stated about anti-D immunoglobulin applied at least in part to other human specific immunoglobulins and developments of this kind produced pressures from clinical colleagues and from the public. As soon as an original publication appeared in the literature, clinical colleagues wanted to introduce the same form of therapy. The general public was very knowledgeable on the Rh blood group, on haemolytic disease of the newborn, and on the prevention of Rh immunisation by the injection of anti-D immunoglobulin. For example, a donor of anti-D plasma might have a younger Rh negative sister not yet immunised. The donor might well feel that her younger sister should have an injection to prevent immunisation.

Dr. I. A. Cook, Regional Director, North of Scotland Blood Transfusion Service, explained that in June 1968, a permanent change to plastic bags was made in the Northern Region. This followed a pilot trial for six months financed by the Scottish Home and Health Department. The use of plastic bags was not new. The Edinburgh Blood Transfusion Service published work on this subject ten years ago and at least seven million such bags are used in America annually.

The reasons for the trial in Inverness were that a firm decision had to be taken for or against bottle-processing equipment for the new centre under construction in Phase I of the new Inverness Central Hospital, and guidance could also be provided in relation to the new centre in Dundee. Plastic bags were a topical subject at the Ministry of Health and it was possible that they might solve problems in the increased demand for plasma for blood products and ensure better utilisation of blood donations.

At clinical level the changeover was smooth. This was probably due to visits made to all the Inverness and twelve outlying hospitals by a representative of the firm who gave demonstrations and a film show in each hospital. This tour of the hospitals followed the course adopted before the Irish Blood Transfusion changed to plastic bags in January 1967.

Dr. Cook described in detail the procedure required at a blood donor session under both the old and new systems. The type of apparatus was shown and it was noted that the main difference between the sessions was that with bags, most of the technical procedures had to be done at the donor bed. This meant that the mobile team assistants had to be retrained. The new procedure required more dexterity and speed. It was important to ensure that the donor was not kept waiting and that sessions ran as rapidly as with bottles and were entirely safe. Slides were shown to illustrate the technique involved, the special tray and trolley and a suitable layout of donor beds. Illustrative donor-session times were given, e.g. 128 in 2 hours 55 minutes; 134 in 3 hours 15 minutes; 144 in 3 hours 12 minutes; 148 in 3 hours 55 minutes and 149 in 3 hours 20 minutes. The incidence of faults in bags had proved very low with only one "pin hole" in 4,500 bags. There had been two artificially induced holes in bags, two tears in tubing and there were three defective welds.

There was an increased use of concentrated red cells. Under the former method the bottle had to be used in 12–24 hours but with the new system a bag could be kept up to ten days. With concentrated red cell bags having a significant shelf life, a red cell bank became feasible. Bags could also be spun rapidly in a refrigerated centrifuge. At present, 20 per cent of blood from every session was spun and plasma separated in 3–18 hours of collection. The process of separating plasma was much quicker with bags than with bottles. Plasma was sent to other centres for use in the preparation of blood products. If clinicians used more concentrated red cells, more plasma could be separated and processing expedited by the use of bags. To obtain still better use of a blood donation it might be possible either to use separate bags or a quadruple pack to obtain concentrated red cells, platelets, cryoprecipitate and cryoprecipitate supernatant.

The main drawback was expense and Dr. Cook indicated that detailed costing had been undertaken in connection with the Inverness trial. While equipment such as pigtail packs at 8/– compared with an A.C.D. bottle and tubing set at 3/9d. a financial credit for the extra plasma obtained was difficult to estimate. Other points arose in relation to labelling, centrifuging, storage, the design of bags and questions of staffing but, overall, the trial had confirmed that the change from bottles to bags in the context of a new Transfusion Centre had been justified.

Dr. J. R. Donald, Consultant Anaesthetist, Law Hospital, reviewed the question of blood loss during surgery and supported the practice of single unit transfusion. The wide range of blood loss was a significant feature of different operations and more important than average values as it was impossible to predict which patient would be at the upper or lower end of the range. The blood lost in a series of 122 pelvic floor repairs indicated that the amounts for those operated on by consultants of over ten years' experience were as great as those performed by registrars. This had also been shown in relation to a series of patients undergoing prostatectomy. It appeared that for unknown reasons some patients bled to an inordinate degree during surgery while others bled hardly at all. Results of a study of the blood volumes of patients injured in road accidents showed that the signs of shock were not present until about 25 per cent of the total blood volume had been lost. This seemed to indicate that if a patient required transfusion, the minimum quantity should be two units. This interpretation was reasonable when applied to accidentally traumatised patients but might not remain valid for those on whom the trauma of surgery was inflicted under anaesthesia. In this context the single unit transfusion might be regarded as an essential part of orthodox practice.

Modern anaesthetic practice avoided the need for deep planes of unconsciousness but it was a misconception to believe that even under light anaesthesia the patient's state followed a normal physiological pattern. Mechanical ventilation disarranged the mechanism for acid-base balance; an alkalosis was almost invariable and this had a widespread effect on enzyme activity. Again, changes were known to occur in the cardio-vascular system, with a fall in blood pressure and vaso-dilatation of superficial blood vessels. Cardiac output might fall and changes in regional blood flow become marked. Cerebral circulation could be altered and massive sequestration of blood might occur with changes in P.C.V. and total red cell mass. All this was before operation, added an element of trauma and stimulated the autonomic nervous system.

An anti-diuretic response occurring with almost every form of anaesthesia was noted and illustrated by the response of volunteers—four healthy adults and a patient undergoing hysterectomy—to intravenous injection of two litres of Ringer Lactate solution. Briefly, the normal diuresis which occurred with the healthy adults was not obtained under anaesthesia.

In a further case no diuretic effect was obtained under light anaesthesia with mechanical ventilation even when no operation was performed. Anaesthesia inhibited the diuretic response which had been obtained in the same patient without an anaesthetic. The relevance of these observations to blood transfusion was that the physiological changes occurring even under light anaesthesia, though they were reversible, were not minimal.

The one factor in elective surgery which could be fairly accurately measured was blood loss and it was not surprising that this was treated by the replacement of whole blood. It was the orthodox view that patients losing 5–10 per cent of total blood volume during surgery should be transfused. In a 70 kg adult this represented about 400 ml, though this figure should be modified in extremes of age, the anaemic, and the "poor risk" patient. Blood loss in the anaesthetised patient could, however, present a different clinical picture from that seen in the conscious traumatised patient. The classical signs of intense activity in the autonomic system might fail to appear and instead a sudden profound hypotension could occur and lead to cardiac arrest. This was prone to occur in the immediate post-operative period when a patient was being moved to the recovery ward. The cardio-vascular system might fail to respond to postural changes and further bleeding into the traumatised area or fluid shifts might aggravate a critically unstable situation. There was no guarantee that in the immediate post-operative period surgical bleeding would have ended. There was, in fact, considerable evidence that a further blood loss might occur. There was also evidence that on average it equalled the operative blood loss and this made anaesthetists hesitate not to transfuse patients when, at the end of an operation, the blood loss was found to be in the 400 ml region.

Various replacement fluids had been used in the experimental animal and survival rates suggested that many fluids could replace blood. This, however, might not be directly applicable to clinical work. The clinician had to concern himself with morbidity as well as mortality. At present and in the absence of experimental proof, it had to be assumed that the best fluid to replace operative blood loss was whole blood. Plasma and plasma volume expanders had almost no place in elective surgery. In emergency, low molecular weight dextran might be used until blood was ready; this was free from the risk of hepatitis.

For the future the indications were that the scope of surgery would extend, organ transplantation would become established and the demand for blood would increase. The practice of measuring surgical blood loss would become more widespread and lead to a further increase in the demand for blood. Like many branches of medicine, the Blood Transfusion Service was the victim of the excellence of its own product.

Dr. G. A. MacDonald, Consultant Haematologist, Royal Infirmary, Glasgow, discussed certain problems of administration and distribution, and noted at the outset that the Department of Haematology at Glasgow Royal Infirmary had the largest workload pertaining to haematology and blood transfusion in the Western Region. In the West of Scotland approximately 100,000 units were collected by the staff of the Regional Blood Transfusion Service. In 1967 over 22,000 units were matched at Glasgow Royal Infirmary; of these 90 per cent were transfused to patients: the transfusion figure was 11,236 specimens.

The staff of the Department of Haematology was responsible for the routine blood transfusion cover for the Infirmary and associated hospitals with a complement of 2,170 beds. There were also 2,221 mental beds in two hospitals; these represent a light transfusion commitment. The main users included a regional major accident unit, an intensive care unit, a regional cardio-vascular unit, a regional haemophilia centre, two obstetrical units (1½ miles and 3 miles from the Infirmary), and a regional plastic surgery unit (7 miles distant). The demands particularly from the accident unit varied from day to day and even from hour to hour.

The regional cardio-vascular surgical unit had two

by-pass operations per week, the patients being grouped well in advance. Ten units of A.C.D. compatible shelf blood were supplied between 0830 hours and 0835 hours on the morning of the operation. If possible this blood was not more than five days old. Arrangements were made to supply five units of compatible fresh blood during the morning. Efficient surgical techniques had resulted in less blood being used; frequently this was under 15 units. Post-operative haemostatic problems were now rare.

The regional haemophilia centre provided a service for over 240 patients and it was the exception rather than the rule not to have some of these patients in the Infirmary under treatment. The obstetrical units served from the department being $1\frac{1}{2}$ miles and 3 miles away gave rise to problems when blood was required urgently and in particular if this coincided with traffic peaks and football crowds. The same difficulty arose in transporting emergency supplies to the regional plastic surgery unit.

In providing a Blood Transfusion Service and to ensure that stock was kept up and no blood wasted, it was of the utmost importance that the staff of the laboratory knew where every unit of blood was. A detailed account was given of the sequence of events after a specimen arrived at the laboratory. The value of a patient control information board was stressed and the way in which a "hospital wide" picture of the position was obtained and kept up to date. It was noted that at various strategic points, e.g. the cardio-vascular unit, the accident unit, the obstetrical unit and the regional plastic surgery unit, small blood bank refrigerators were located; these hold up to 40 units of blood under proper conditions.

Blood products were also used. Cryoprecipitate was prepared during 1966 and this was now undertaken on a larger scale by the Regional Blood Transfusion Service. Experience with cryoprecipitate in the treatment of haemophilia had been a happy one and major surgical procedures had been undertaken on haemophiliacs. In vivo assays of F.VIII had been satisfactory, though experience with Concentrated Human F.VIII had been less fortunate. In the first ten months of this year 2,516 units of cryoprecipitate and 1,007 of F.F.P were issued.

Less reconstituted plasma was being used in the accident unit and a dextran preparation in normal saline was being employed as a plasma volume expander. Large volumes of whole plasma carried a risk of acute hepatic necrosis associated with serum hepatitis. It was several years since the M.R.C. Blood Transfusion Research Committee recommended that the use of whole plasma as a volume expander should be abandoned and its place taken by non-icterogenic protein fluids such as plasma protein fraction or albumin. It appeared, however, that these safer expanders were not likely to become generally available until 1972. It was noted that in the United States of America the use of whole plasma had been banned by Federal Law because of its icterogenicity.

Sudden demands during normal working hours presented little difficulty; the main administrative problems centred on the emergency service. In 1960 at Glasgow Royal Infirmary a service was instituted whereby cover for blood transfusions from 1700 hours until 0830 hours the next day and from 1230 hours on Saturday to 0830 hours on Monday would be provided on an emergency "on-call" system; the duty technician being called from home. In the past eight years the number of calls had more than doubled. From January to October 1968, 1,109 calls outside office hours had occurred. In this period the number of units matched averaged 468 per month with a range of 357 to 584.

The "on-call" service was voluntary on the part of technicians; there was nothing in their contracts or terms of service to require them to take part in it. It was necessary, of course, only to employ suitably qualified and experienced technicians for this type of work and in practice it was also dependent on the good will of other laboratory chiefs and technicians for the provision of staff. At present the service was supported by technical staff from four laboratory departments in addition to haematology. The demands had grown to the extent that this duty was no longer as acceptable to technical staff as it used to be. Transport problems and Whitley Council conditions were not conducive to this type of service.

Dr. MacDonald gave a detailed account of the work undertaken over two weekends when 61 and 87 units were matched respectively. It was noted in passing that stabbings led to only a small part of the demand for blood. A further difficulty during weekends was that the Regional Blood Transfusion Service Centre was situated at a distance of 20 miles. This could lead to delay and delay, either in receiving suitable blood or in the technician's arrival from his home, carried an element of risk.

It appeared incontrovertible that emergency cover for blood transfusion in a large teaching hospital incorporating a regional accident unit and a maternity unit should have a 24-hour service, seven days a week. While this was agreed in principle it seemed probable that no significant improvement would be achieved without a financial infusion to allow adequate numbers of technicians to be employed and remunerated sufficiently to make this attractive. If this was not forthcoming, it would be necessary to accept a second-rate service; the situation had been reached where compromise was no longer adequate or sufficient. In detailing the situation in his department, Dr. MacDonald suggested that, except in scale, such problems were not peculiar to Glasgow Royal Infirmary.

DISCUSSION

The discussion was opened by **Professor J. D. Robertson,** of the Department of Anaesthetics, The Royal Infirmary of Edinburgh. He noted the need to encourage and possibly to extend donor panels. It might be possible, for example, to obtain additional donations from the relatives of patients who had drawn from a "bank" to which an obligation had thus been incurred. The education of clinicians in the storage and handling of blood was necessary and would help to ensure the prompt return of reusable supplies which were not immediately required. Where problems of priority were involved in the development of the Service, it was important that the clinicians should be in a position to identify, present and press their requirements.

During the subsequent discussion the following points emerged:—

1. **Plastic bags**

(*a*) **Effects on timing**

Donor sessions were often held in circumstances where time was limited. Various experiences of the timing required per patient using bags or bottles were quoted. Although these were difficult to compare in detail, it seemed that the use of bags took little, if any longer, while they carried the advantage of a closed transfer. Savings in staff time were obtained in cleaning and as used bottles did not require to be collected for return; the return of the label was sufficient to record the use of a unit.

(*b*) **Cost**

It was noted that the costing equation in relation to a new unit was different from the situation in an existing department already equipped. There was a hope that prices would drop if larger numbers of plastic bags were used. It appeared that the cost of bags varied widely in different countries.

(*c*) **Clinicians' reactions**

In the Inverness experiment the doctors' reactions to the use of plastic bags had been uniformly favourable. The possibility that haematoma might result from delay following the automatic cut-out was not borne out by experience.

(*d*) **Pin holes**

It was suggested that the Inverness experiment had been fortunate and that pin holes—while varying in incidence from batch to batch—still represented a problem.

(*e*) **Storage**

While some problems in the handling and storage of bags remained to be solved, it was not considered that these presented serious difficulties.

2. **Donor panels**

As volunteers who accepted increasing demands on their time, the importance of blood donors could not be over-estimated. Their function was changing and it was essential to maintain their confidence and interest. This should be a major concern of the Blood Transfusion Service.

It was important to encourage relatives of patients to donate blood and, while a "replacement" system had been used twenty years ago, this could lead to difficulties in relation to documentation, age limits, encroachment on nurses' time, usability of the donation as whole blood and in the fact that an approach at a time of stress could be inappropriate. An adequate size of panel of enrolled donors was vital to the possibility of rapid collection in emergency. The formation in the States of small donor clubs of 50–100 people was mentioned. These clubs contracted to provide a certain number of units annually and to replace blood which had been required by a member of the club.

3. **Staffing and terms of service**

Staffing required attention in relation to established levels and it was agreed that where the workload was excessive, errors might occur. In large centres a full-time emergency staff was necessary if the priority service required by clinicians on behalf of their patients was to be provided. The promotion of special terms of service for particular hospitals with unusual workloads presented difficulties. Many factors were involved in altering conditions of service and career prospects for technical staff but the position was being reviewed. The solution to staffing problems was not only concerned with finance, though this undoubtedly played a major part in providing for a rapidly developing and essential service, and a report relevant to this question was expected soon.

4. **Measuring blood loss**

In reply to an enquiry it was maintained that the careful weighing of swabs and drapes was sufficiently accurate in recording blood loss at operation.

November 1968

MEDICAL RECORD LINKAGE

There has been a remarkable upsurge of interest in this subject. The main objectives were outlined, recent experience presented, its value in research stressed and steps being taken towards a comprehensive system of linkage were explained.

Dr. J. H. F. Brotherston, Chief Medical Officer, Scottish Home and Health Department, took the Chair. He noted that an exchange of information on "who can give what" to the task of making the most effective use of records in the interests of individual patients and of epidemiological research was the main objective of the meeting.

Dr. M. A. Heasman, Co-Director, Research and Intelligence Unit, Scottish Home and Health Department, drew attention at the outset to the fact that medical record linkage still had its difficulties. Workers in the nineteenth century were aware of its value and, although not known under that name, it was being used in epidemiological research. Linkage was developed to a considerable extent in the 1940s, but many still remained unaware of its scope and objectives. Recent advances could be reported but there were as yet few practical results of direct value to the service. In these circumstances it might be premature to widen the discussion. Much interest was being shown in record linkage, however, and many who were now or would soon be involved in it, should be aware of the stage reached and the plans for its development on a national scale.

The term "Medical Record Linkage" involved bringing selected biological data for a population into a series of personal, cumulative files beginning with conception and ending in death. The metaphor used by H. L. Dunn was a clear expression of what the term entailed:—

> "Each person in the world creates a book of life. This book starts with life and ends with death. Its pages are made up of the records of the principal events in life. Record linkage is the name given to the process of assembling the pages of this book into a volume".

Three main types of record linkage had been described:—

1. The laborious ad hoc follow-up of individuals as used in many early clinical and epidemiological studies, for example, in relation to smoking and lung cancer.
2. The type used in most hospitals in which a patient's notes are brought together in one place irrespective of the clinical department involved. Similarly, disease registers attempted to bring together records of events occurring to persons with that disease, e.g. the cancer register. Types 1 and 2 did not necessitate the use of a computer.
3. The general "statistical" type which would be the main subject for discussion. These studies would have limited value to the individual patient as identification was not 100 per cent certain and the length of the record held on file would be limited.

Dr. Heasman considered that a fourth type should be added and would be required in any computer-based medical record system in hospitals and health centres in the future. Type (4) was a general "personal" record, it involved a difference of approach but not of principle. It required identification of a particular patient with virtually 100 per cent certainty and a high level of accuracy in linkages.

The third type mentioned above was the one with which present developments at national level in Scotland were primarily concerned. A tentative programme had been prepared and the experimental period was one in which "hunches" were being tested to ensure that the linkage of hospital in-patient statistical records could be achieved. Early results were encouraging. Thanks to the work of the Scottish Office Computer Service, records had been matched with a considerable degree of success. A linked hospital in-patient statistical file should be available by the end of 1969 or early 1970. With the co-operation of the Registrar General certain death data might be brought in beween 1970 and 1972, and there should be no difficulty in including in the file the remainder of the departmental summary patient-based records. As time would be required to learn how to use such a large body of data it was difficult to look beyond mid-1970. By that time the Northern Ireland scheme and further work in Oxford, Glasgow and Aberdeen would be available to influence the extensions which might take place in 1972.

The uses to which a record linkage file could be put were classified under five headings—epidemiological, clinical, administrative, genetic and personal. The pre-1972 schedule did not include plans for the genetic use of the national file but the other uses would be developed to the fullest extent possible. The "personal" use would remain limited while linkage methods did not ensure 100 per cent success and if speed of access to the file was not rapid enough to be of benefit to the individual patient under normal circumstances. If, however, record numbers for patients from other hospitals could be provided, this would considerably reduce delays when those records were requested. The development of a service on these lines would depend on the demand for it.

At present, the statistics produced by the Scottish Home and Health Department were based on single events. This meant that spells of treatment were recorded and not the number of people treated. The provision of better statistics and of the follow-up service were important to clinicians, epidemiologists and administrators. With a fully developed record linkage system it should be possible in a relatively short period of time to produce data giving a fairly accurate measure of the incidence of the more serious diseases, i.e. those likely at some time during their course to require treatment in hospital. This would provide epidemiologists and administrators with statistics which were either non-existent at the moment or could only be found after extensive investigation. It meant that the routine production of statistics and the unit's ability to provide a service to answer ad hoc requests would be enhanced and it was probable that the whole presentation of hospital morbidity statistics would undergo a complete change. There would still be room for measures taking into account the spell of treatment, but it was more likely that the majority of basic statistics at national, regional and local hospital level would be dealt with on a basis of the individual patient.

Dr. Heasman believed that record linkage could make its most important initial impact in the follow-up service. At present, hospital records were frequently deficient in the necessary information. Either on a routine or an ad hoc basis it would be possible to provide clinicians and research workers with details of the hospital history and where appropriate the subsequent death of any individual who had been a hospital in-patient since January 1967. Clinicians who wished to follow up individual cases with whom they had lost contact would only require to provide the appropriate identification details.

The question of identification was important. It must be unique to the person concerned, permanent —in that it remains the same throughout life— universal to all members of the population, available and economical. An ideal system was difficult to attain. Some favoured the use of a national numbering system similar to the N.H.S. number. Many, however, did not know their number or carry the appropriate card. "Statistical" record linkage did not depend upon a number for its success. Much could be done using the characteristics of the surname, initials, sex and date of birth. In Scotland, if correctly and completely recorded, these data should enable linkage of over 99 per cent of individuals without duplication. It was not proposed at present to ask for details of the mother's maiden surname, place of birth or N.H.S. number. Patients should not gain the impression of officiousness or that apparently unnecessary information was being sought. It was essential that the patient should not react adversely against the hospital authorities. Again, the record clerkess had a busy, responsible and difficult job and should not be burdened unnecessarily by adding an element of tension between her and the patient. For these reasons economy in identification was the initial policy but some extension might be undertaken later and in particular if the genetic or computer-based "personal" uses were developed.

The results had brought home yet again the need to stress accuracy in the completion of even simple information. Progress had been encouraging and was the result of team effort by many people. There was still a long way to go but there were grounds to hope that a tool could be forged which would be of lasting benefit in every branch of medicine.

Dr. E. D. Acheson, Director, Oxford Record Linkage Unit, Oxford Regional Hospital Board, noted that the need to re-organise medical data was based on the rise in the importance of chronic disease, of human genetics and the increase in the fragmentation of personal records due to specialisation. Record linkage could be looked at from various points of view. It facilitated though it did not replace ad hoc studies and it provided cumulative personal records of selected data of value to medical records and intelligence. It could be used to provide and test hypotheses and in the follow-up of patients.

The pilot study at Oxford began in 1962 and aimed to assess the feasibility of abstracting data on important health events from a defined population, the development of cumulative files and of computer methods of record linkage. Experience had underlined the need to relate data to a population of this kind and the importance of deciding the events to be entered in personal and family files. A stage had been reached where some 100,000 records from a population of 750,000 people in Oxfordshire and part of Berkshire were processed each year; 57 hospitals and four public health authorities were involved.

In the development of studies and the matching of admissions certain important and practical points had emerged. While, for example, a hospital might assume that its records were complete, information on as many as one-quarter of the deaths occurring six months after discharge was not known, yet would have been of clinical interest. In one instance of 1,370 deaths within two years of discharge only 38 per cent were recorded in the hospital notes.

When patients who had sustained fractured femurs were studied as a cohort for one year it was found that the apparent difference in fatality rates at the two hospitals gave a misleading impression of the ultimate outcome. Where, for example, a hospital discharged a patient early the fatality rate at that hospital was low; where the patient was longer in hospital the fatality rate was higher, but the complementary rate in a secondary area of accommodation was correspondingly reduced. Considerable differences had been identified in units providing accident services in the number of days between admission and operation and in general it appeared that clinicians were frequently unaware of the patient's subsequent experience after leaving the wards.

Points of interest had also emerged in relation to re-admissions and the fact that where statistics were based on the number of discharges, the morbidity rates were inflated insofar as the records related to episodes of illness and not to individual people. Clarification of the background and the real meaning of the statistics were important both to clinicians and to hospital administrators. In maternity work the "booking" policy might be affected by the collation of data concerning the life history of mothers and their infants. Records of successive babies born to a mother and their birth weight, in particular, could prove important in the management of a subsequent pregnancy. Cumulative files could prove valuable both in starting ad hoc studies and in their development. Record linkage, to be of maximum effect should, however, be applied on as wide a geographical scale as possible. This minimised the effects of migration and incorporated the widest possible range of influence. For any class of health event it was important to work out the magnitude of the data processing involved. The logistics must be right at the commencement of a study. A further objective of the Nuffield pilot study was to encourage a system of linked medical records on a national scale. This remained an important aim.

Dr. W. R. S. Doll, Director, Statistical Research Unit, Medical Research Council, referred to pioneering work by Witts and Truelove in the development of record linkage in the United Kingdom and to the way in which even relatively recent research projects would have been facilitated and improved qualitatively had linked records been available. Uses of record linkage which had been accepted were:—

1. To facilitate the exchange of information required for the treatment of patients.
2. To identify groups of subjects at special risk who required surveillance.
3. To permit the development of an adequate intelligence service, for assessing the operations of the National Health Service.

4. To enable the inter-relationship between disease to be studied on a large scale.
5. To facilitate the study of the health experience of groups of individuals characterised by possession of specific genetic markers or by exposure to specific agents.
6. To provide the opportunity for studying the effect of medical and social changes on the genetic constitution of the population.

In the evaluation of health services and in particular in follow-up studies of groups of people exposed to different influences in their environment, record linkage would be of the first importance. For example, the effects of irradiation and of oral contraceptives could be defined more rapidly in a situation where records were effectively "linked" and problems such as the increase in the death rate from asthma could be more effectively studied. The inter-relationship between diseases was becoming more important and this would increase in circumstances where a particular form of treatment might itself initiate a disease process.

Increased emphasis was likely to be placed on follow-up studies, and to obtain a group of suitable size to permit significant results to be obtained record linkage would be of enormous assistance. Some instances were given. The possible relationship between infectious mononucleosis and Hodgkins disease would require more than the relatively small studies which current case records would permit. Again, links between prostatic cancer and coronary disease involved complex relationships which could only be evaluated on a regional if not on a national scale. The influence of the thymus on carcinoma was also a field in which record linkage could help.

Dr. Doll reviewed studies which would have been greatly facilitated if record linkage had been available. These included studies of cancer of the lung, the effects of oral contraceptives, follow-up studies of gas-workers, people employed in wartime as "luminisers" and of radiologists and asbestos workers. In follow-up studies factors of morbidity were important as well as mortality and over a period of years record linkage would have been invaluable. It might, for example, have been possible to study the effect of small doses of asbestos dust in relation to the development of pleural meso-epithelioma and, as regards radiation, possible effects on the offspring might have been identified in earlier studies had record linkage been available. Studies could be facilitated using record linkage in, for example, the question of blood groups in relation to disease. Not only might the scale of survey work be greatly extended but the entire morbidity pattern of groups could be more effectively studied.

Dr. J. A. Baldwin, Research Fellow, Mental Health Research Unit, University of Aberdeen, discussed the register as a mental health record system and noted that registers were information systems, and means of collecting, storing and retrieving information for specified purposes. The case register was a cumulative file of person-based, linked records drawn as a random, selected or total sample of individuals with one or more specified characteristics. In psychiatry the input was a selected sample of patients with psychiatric disorder, the selection being on some variant of the criterion of being referred to psychiatric services. The North-East Scottish register covered the North-Eastern Regional Hospital Board area, some 4,500 square miles divided into six counties and a city with a total population of a bit under half a million. The population was a stable and fairly closely knit community, half urban and half rural. Few sought treatment outside the area, so the region was an excellent population laboratory for epidemiological research.

The psychiatric and mental subnormality services were well integrated on a regional basis with 3,500 in care on any day, 3,400 entering care in a year and 10,000 movements per annum. A complex of interlocking and inter-dependent types of care provided alternative and complementary pathways along which the patient might move in response to individual and situationally specific clinical and social needs. This represented an essentially new form of organisation of medical care which has no analogy in existing general health service systems.

When the case register was started seven years ago, the need for an information system to cope with the rapidly changing situation was recognised. A variety of potential users' needs required to be met:—

1. Clinical records providing the right information about the right patient at the place and time and in the form required.
2. Reliable data on all treated morbidity beyond the diminishing fraction represented by hospital admissions. This involved research interests in both epidemiology and the clinical fields.
3. Information for planning and management on what the hospital service was doing and how it was being used.

There were two kinds of psychiatric register—the reporting system and integrated clinical record system. The former depended on regular reports from clinical or social agencies and combined these into a linked interior supra-agency file. The latter was based on the unit clinical record which was itself a person-based, linked record. Part or all of the clinical record formed the input to a data processing system which enabled selective retrieval of grouped information, rather than simply the individual case record. The system had been in operation since 1963. The principal use was the case record in everyday clinical service. This functioned much as any ordinary unit medical record system, the folder following the patients from unit to unit, though in a complex regional service close attention had to be given to the updating and rapid transfer of records. The output from an information system could be of no better quality than the input. Questions of pertinence of error and under-reporting demanded intensive and continuing study and it was folly to minimise or deny their importance. It had been found impossible to rely on doctors and nurses to collect the main systematic data, trained clerical staff did this work more cheaply, more reliably and more completely and they saved doctor's time which was expensive.

Apart from the clinical record itself, other functions were served by a computer-based data processing system which contained the systematic parts of the case record on each patient linked into a cumulative file and kept up to date. The following uses were made of the system:—

1. **Provision of service management information**
   This had taken two forms. First, a series of tables was prepared relating to each year's

work for distribution to administrative staff, medical superintendents and other interested people. These tables were produced and printed up directly on the computer. They were arranged in volumes relating to the psychiatric and mental deficiency services as a whole and to individual units or groups of units as requested. The tables were numerous but very simple, being designed to yield the most useful information with the least effort at interpretation, as most users were not accustomed to reading tabular material. These annual operational tables were an example of routine feedback. It was difficult to know what would be most valuable; the policy had been to provide a reference volume which supplemented more focussed reports and which, over the years, would enable easy compilation of trend data and foster the habit of thinking quantitatively. Considerable use was being made of them and as the educational process proceeded, the least useful material would be omitted.

The second type of management information system was the ad hoc enquiry. Specific requests for information from users were answered and examples were numerous. The Regional Hospital Board, for instance, wanted to know what additional case-load would result from a realignment of the catchment area of a hospital on appointment of an additional consultant. Numerical confirmation of their supposition was given in a very short time. In another case the Regional Board was asked to report on the numbers of children referred by social and legal agencies over several years. These data were supplied at no cost in time or money to the Board—otherwise this would have had to be collected by asking consultants to search their records—a process which might have taken weeks or months and been unreliable. Some restriction had to be put on this service, partly from using a computer 130 miles away. With a larger machine closer to hand it would be less difficult to write and run searches of this sort.

A third type of service, which could easily be developed with better access to hardware, was systematic patient care evaluation. Individual psychiatrists could have their work summarised in a variety of ways at regular and convenient intervals.

2. **Operational research projects**

Till now the particular concern had been obtaining good measures of the demand for various types of psychiatric care and with the relationship between the parts of the service system. The information system was ideally suited to the standard types of patient movement study, following trends in admissions, the resident population in mental hospitals, and hospital activity analysis generally.

Models of hospital function had been developed and could be used in evaluation of clinical and administrative policy decisions, such as numbers of beds of various types. In one example, a consultant was being helped to control the bed situation in a geriatric unit by using the computer to predict week by week the outcome of admissions and project the bed state several months in advance. The potential for this sort of use was great.

3. Some ways in which individual clinicians doing research could be helped by the information system were mentioned to illustrate the flexibility of the register. Little purely clinical information was collected as a routine, mainly because of the inherent unreliability of much of it. It seemed preferable to facilitate development of reliable clinical indices by small scale special studies.

(*a*) **Use of the interviewer data collection procedure as a screen for prospective sample selection**

By incorporating one or two questions in the routine data gathering interview it was possible to filter out cases on which special studies were being conducted and direct them to the appropriate clinical staff.

(*b*) **Retrospective sample selection**

Several small studies had been based on retrospective samples drawn from the register files, usually as ad hoc enquiries. Having identified the cases, the researcher might use standard data from the case register or go back to the case records, or both. A feature of this facility was that it enabled "browsing" and the following of "hunches".

(*c*) **Matched samples, representative samples and data linkage**

Most of the clinical studies had used register data in one form or another. Information on the identified cases was taken from the "bank" for the use of the researcher, whose special information could then be added and the composite records put on punch cards and processed by the researcher himself. This was preferable as there was a greater sense of security, particularly to the inexperienced, by keeping physical control of the work. With the relatively small scale of processing employed in most clinical research it was scarcely worthwhile programming a computer.

4. **Epidemiology**

The register data from 1963 to 1967 were being used to form the basis of a study of five year incidence and prevalence of reported psychiatric disorder. The large numbers (about 16,750 persons) would allow detailed analysis of several variables simultaneously and enable trend analyses to be carried out. The study would include examination of the effect of marital status—re-testing classical work in a present-day integrated psychiatric service with comprehensive coverage of extra-mural and intra-mural care. There would be special studies of schizophrenia and of social class where there was evidence of recent changes in the assumed traditional pattern. Compara-

tive studies with other registers would also be carried out.

A unique characteristic of information systems of the register type was that their value increased with longevity. Cohort and trend analyses became progressively more extensive and the value of the universe as a sampling frame was augmented. Concurrent with the study of prevalence and incidence, the five year file of cumulated linked data was being used to develop the methodology of cohort analysis. A probability model, which owed much to the life-table approach for recurrent episodes of care and unequal follow-up periods, had been devised to yield prognostic tables for varying combinations of patient and service characteristics. It was hoped that this study might eventually lead to clinical applications, possibly by means of direct clinical access to the record retrieval system.

5. **Clinical application**

Interview protocols on about 7,500 patients were being used for a study of the relationships between psychiatric illness and parent loss. A prospective study of the outcome of patients referred for possible termination of pregnancy was also being conducted using the interviewer system as a means of screening patients and for some data collection.

6. **Record linking**

For data processing functions a computer was needed except for really small systems containing only a few hundred records. Processing by card handling equipment alone became unmanageable using the temporal feature of the longitudinal record for cohort analyses, and was cumbersome when the record exceeded the capacity of a single punch card. For systems of quite large size, however, it was practical to carry out manually all name matching in order to link records. This was tested by means of a semi-automated matching procedure on the first 13,000 registrations in the manual system and a duplication rate of about 1·3 per thousand records was found which was as good as with any method. This was important. It meant that the difficult, but not necessarily expensive, computerising of the name-matching process could be avoided, at least at the start. There would be some apprehension, however, when files reached 50,000. If likely to be dealing with 100,000 names or more the linking process should be automated from the start.

7. **Family record linking**

Apart from the obvious genetic interest of bringing together records belonging to different members of the same family or household, there was a special relevance to psychiatry where the small group processes might have an important bearing on the development of pathology. Methods had been developed using the standard data from the clinical record, of linking sibs, parents and children, and married pairs. There was little doubt that answers to problems such as those of married couples entering psychiatric care required record linkage systems.

The proper conduct of research almost always involved the collection of data matched to its specific objectives. Borrowed data rarely fitted precisely the needs of a problem for which they were not collected. Similarly, retrospective data were seldom adequate since they were often incomplete and of varying quality. The register concept did not preclude the collection of special data for special purposes. On the contrary, the input system might actually facilitate special data collection. The register provided a more adequate form of retrospective data store since its content was known, its quality was predictable and it was easily and economically searched. The data bank was also a facility for prospective collection of relatively "hard" data in almost universal use, such as patient's date of birth or age, sex, and date of or age at marriage. In these ways the register was more flexible and adaptable as a research tool than the once-for-all type of approach to research data collection. Looking to the future, it was easy to envisage the development of a remarkable communications system for the health field based on the linked file. Dr. Acheson had elaborated this concept in his recent book.* In the psychiatric field there were obvious social as well as genetic reasons to link together pathological records relating to members of the same family or household, and the extension of this to the use of social welfare and social control agencies. Both these things had begun in Aberdeen. Till now the system had been built without recourse to vital records, but this would have to come soon. There was already concern with death records, since deaths out of hospital were a proportion which affected the risk population in cohort studies to a marked degree. Eventual linkage with physical health records might be envisaged so that associations between emotional breakdown and physical illness might be studied systematically.

It was obvious that all the diverse needs for information could not be met at once. Nor was this necessary since for many purposes, particularly in research and planning, generalisation from adequate samples was more reliable, more efficient and more economic. Yet in other respects, it was desirable that basic data should be generally available for the provision and evaluation of clinical service, and for the conduct of research appropriate to the local situation. The first question to be asked about systematic data collection was: "What use will be made of these data and what questions will they be required to answer?". Thereafter, "What data were required to answer these questions and in what form will it be necessary to organise them in order to answer the questions?". When the necessary data have been defined, the final question should be, "Can these data be obtained with sufficient reliability by means of the methods and resources available?". It will often be found that surprisingly little information was required if it was of high quality and if the purposes were precisely defined. With a little ingenuity, sufficient capacity for rearrangement could often be incorporated to allow multiple purposes to be combined with only minor additions, but the temptation to substitute quantity and diversity for quality and relevance should be resisted.

* Acheson, E. D. Medical record linkage. London, O.U.P. for N.P.H.T., 1967.

In summary, the psychiatric case register constituted a comprehensive cumulative regional mental health service information system capable of great flexibility, yielding sophisticated management data, and facilitating a variety of types of clinical and epidemiological research. Its success has depended upon the characteristics of the region, its population, its integrated system of mental health services, and the favourable climate of opinion among the co-operating institutions of the health service, the university and the funding organisations.

The register method was a powerful research tool which it will take time to learn to use to the full. Its assets and its limitations stemmed from its derivation from the clinical record. It could provide information only on treated morbidity, and was not a substitute for other population methods. It should be seen as complementary to direct epidemiological and social studies on the one hand, and to more specialised clinical, anthropological, sociological, psychological and laboratory studies on the other. It was a costly technique, demanding of both staff and resources. The cost, complexity and difficulty of implementation increased disproportionately to the size and complexity of the area and the service programme to which it was applied. For this reason, it had limited general applicability until the necessary technology became cheaper, more acceptable to health service staff, and more widely available. In the initial stages, register areas should be selected for their special features and the form and content of the register should be general to their specific needs and characteristics, with only a minimal common network of linked national data to permit complete follow-up. There was much to be said for the concept of the "experimental area" in which expensive research could be concentrated, augmenting existing facilities and complementing work already in progress, rather than diffusing limited resources.

Mr. J. S. Robertson, Scottish Office Computer Services, outlined methods and first results in medical record linkage in Scotland. He explained that the Scottish Officer Computer Service (S.O.C.S.) was a government bureau providing a service for the four Scottish government departments and certain allied bodies. He noted that it was fairly easy on computers to match records which had a common identifying number. Reference numbers were not always a possibility and efforts had been made to develop a method that did not depend on a number.

A two-fold approach to record linkage had been adopted, i.e. for records that came solely from hospital in-patient record summary sheets on the one hand and, on the other, using these sheets together with vital statistics (births, marriages, deaths), maternity records, council records, mental health records, etc. In the current experiment, computer runs were designed to enable them to be used, if successful, on the first of these bases. In the computer programme itself, however, when records were compared one with another, any attempt to rely on information only available in these records was avoided. For example, no attention was paid to the hospital case reference number in the records.

The results obtained so far have used information that is commonly available in all forms of records. A revised style of record sheet was introduced in January 1967 since when some 500,000 records have been placed on magnetic tape and are held at S.O.C.S. A sheet is completed each time the patient:—

(*a*) is transferred within a hospital from one consultant to another;
(*b*) is discharged from one hospital to another including a convalescent hospital;
(*c*) is discharged from a hospital to his home, etc.;
(*d*) dies in hospital.

Some 31 items of information from the hospital in-patient record summary sheets were held on magnetic tape and with the co-operation of the Records Officer, Western General Hospital, Edinburgh, a check on the method was undertaken involving some 400 patients who had either come to the hospital from another Scottish hospital or who had gone from the Western General Hospital to a hospital elsewhere in Scotland. A sample of 442 records was copied and this could then be compared with the Scottish records of the total hospital discharges for 1967 (including those in the sample group).

For this experiment in matching it was decided to use only the patient's surname (using soundex code), initials, sex and date of birth. It was known that surnames tended to be misquoted, that variations in spelling were frequent and that errors could occur in recording names which sounded similar. Again, discrepancies were common in date of birth and even a patient's sex could be mis-coded. With the soundex system, names were coded under their initial letters; vowels and letters h, w and y were ignored and all other consonants were represented by numbers. The name Smith would thus appear as S530; this would also be the code for Smythe. The system gave the same code to like-sounding names and thus attempted to overcome variations in spelling. The problems of mistakes in dates of birth, initials and sex remained, however, and for these certain weightings were used in comparing the various parts of records. Points were added of items agreed and subtracted when they disagreed. The accumulated points gave a score for the record under comparison.

The weightings used were summarised as follows:—

(*a*) Day and month agree	+8
(*b*) Either day or month agree	+1
(*c*) Neither day nor month agree	−6
(*d*) Months agree (days absent)	+1
(*e*) Months disagree (days absent)	−3
(*f*) Full match minimum score	0
(*g*) Partial match minimum score	−5

All other aspects, e.g. the absence of an initial or of both day and month were given a score of ZERO (i.e. were ignored and therefore had no effect).

The computer running technique was outlined for the experimental runs started with the 1967 in-patient records adding soundex, various stages of linking and printing. The comparison of each record on one file with each record within the same soundex group on the other file gave a weightings score that ranged from a minus quantity to a positive one of up to 22. The higher the score the more likely it was that a match had been obtained.

In the first run when no weightings were used the results were poor. In subsequent runs using weightings the results were much better. Success rates of 90 per cent and over were achieved with the records from the hospital within which the patient had been transferred and with corresponding records from the hospital to which patients were transferred. It was

concluded from this experiment that linkage of in-patient records could be achieved using surname, initials, date of birth and sex as primary data. Further work was needed, however, as regards secondary matchings for marital status, occupation, area of reference, diagnosis, etc. Matching would be improved when the system of weighting had been further refined. In transfers within a hospital, even greater success was likely using the hospital case reference number.

For the future it was necessary to seek greater accuracy in the completion of forms and the system of weightings would require adjustment to increase their range of values and widen the spread of scores. Similarly, the coding system in soundex would be improved with experience of its use. As regards in-patient records and long-term plans for record linkage, a magnetic tape file would be compiled each year for statistical purposes. It would contain all summary sheet details from the hospital in-patient records. These records would be given soundex coding for matching purposes and three magnetic tape files would be created:—

(*a*) A master catalogue containing for each patient who has a discharge record, his identifying particulars (e.g. surname, initials, sex, date of birth) and a unique catalogued number allocated by the computer.

(*b*) A newcomer file containing each in-patient discharge record that has not been run against the master catalogue; each record would have all the patient's relevant discharge data plus his soundex code.

(*c*) A master file containing all the in-patient discharge records that have been run against the master catalogue; each record would have all the patient's relevant discharge data plus his soundex code and his catalogue number.

Records in the master file would be held in catalogue number order; records in the master catalogue and newcomer files would be held in random order within soundex blocks.

Each newcomer record in a soundex block would be compared with every record in the same soundex block in the master catalogue and with every other newcomer record in the same soundex block. In these comparisons a new match score would be calculated for each comparison. The new score would only override the old score if the new value was greater than the old. When a new score was inserted, the catalogue number of the matching record would be attached to the newcomer record.

When all possible comparisons had been made, the catalogue number attached to each newcomer record would only be that of the record it matched where the score was above a minimum percentage of the maximum possible. All unmatched newcomer details would be added to the master catalogue; all matched newcomers would be transferred to the master file.

As regards costs, the Treasury O. & M. Branch had estimated that to set up a record linkage system by non-computer methods would have cost at least £190,000 each year in the first two years and would grow further in subsequent years. Although there was still a long way to go, the cost in S.O.C.S. of the exercise to date was only £2,004.

Dr. I. D. G. Richards, Social Paediatric Research Group, University of Glasgow, explained how this group had been established in 1966 under joint sponsorship of the Department of Child Health, Glasgow University, and the Health and Welfare Department of Glasgow Corporation. This had created a unique situation in which access was afforded to the records of a large well-defined population, with about 20,000 births a year, and to the Corporation's IBM 360/30 computer. With this, a system was being developed for maintaining a file of linked records on the health and development of children. This involved reports available to the Local Health Authority, many of which would not normally be linked together. The data included:—

1. The record of the child's birth. Many health departments matched birth notification and registration. The details taken included name, mother's maiden surname, address, date of birth, sex, birth weight, legitimacy, date of parents' marriage, N.H.S. number, social class and the cause of still-birth (if relevant).
2. A health visitor's report of obstetric and social factors surrounding the birth.
3. Registration of death in childhood (if relevant).
4. Change of address. This was mostly obtained by health visitors and represented some 10,000 changes per annum.
5. Health visitor's record of infant nutrition, social circumstances, health and development. This involved re-structuring the infant welfare record.
6. Hospital in-patient data (S.M.R.1) from the Scottish Home and Health Department—with the consent of the paediatricians.

It was intended to add:—

1. Notifications of handicap (from the Scottish Home and Health Department).
2. Notifications of certain infectious diseases.
3. Immunisation records.
4. School health service records.

It would also be valuable to include reliable obstetric data and the results of ad hoc surveys on child nutrition and development might also be included.

The linkage method consisted of paired parental surnames—each coded into a numeric four digit code. The conditions for a match were laid down, i.e. when surname code, LHA index number, sex and date of birth all agreed. Corrections were made to 1·6 per cent of records and the surname code was discrepant in under 1 per cent (3 out of 380).

To safeguard the confidentiality of statistical data a two-file system was used—an identification and a statistical file. All statistical data was anonymous. The cost of the scheme was £4,100 p.a. (punching £600, machine time £2,000, salary £1,500).

The existence of a linked file of records afforded many opportunities in research and administration. Few studies of child health and development had been based on substantial numbers of cases or on observation of a whole natural population of children and over a spell of several years of births. This was now possible and the uses to which the system would be put included:—

1. The compiling of a congenital malformation register from multiple sources in order to study the epidemiology of these conditions.
2. The investigation of malformation recurrence risks and of familial patterns of disease.

3. The study of associations between obstetric or social hazards and handicapping conditions.
4. The study of determinants of I.Q. level in educational attainment.
5. Sibship studies of birth weight and length of gestation.

In administration the main uses would be:—

1. Computer control of immunisation appointments.
2. Automate appointments for routine medical and developmental examinations or for the surveillance of children at particular risk of developing a handicap.
3. Monitoring of community health—investigating trends in death rate, congenital malformations, other handicapping conditions, accident and sickness rates and to study the effect of such variables as area of residence and social class.
4. Monitoring of the standards of medical care.

Programming had been undertaken for two years and analyses of obstetric care and perinatal mortality in 1967 provided an example of the usefulness of a linked system of records in both research and administration.

As regards perinatal mortality:—

1. The overall rate for Glasgow in 1967 was 31·3 per thousand total births (E. and W. 25, Scotland 27·5). Many of the analyses demonstrated the well-known relationships between perinatal mortality and the infant's sex, birth weight, legitimacy and maternal age and parity.
2. A history of previous miscarriage or still-birth was associated with high mortality but, surprisingly, there was no demonstrable relationship between mortality and the stage of pregnancy at which antenatal care began—except when begun after the fortieth week!
3. The mother's social circumstances were estimated in terms of room density and whether the family had its own supply of running hot water and its own W.C. Although lack of either or both of these amenities was associated with an increased proportion of low birth-weight babies none of these social parameters showed any clear association with perinatal mortality.

There were two significant features in relation to births in Glasgow in 1967:—

1. One quarter (25 per cent) were to women having their fourth or subsequent babies (E. & W. 17 per cent, Scotland 20 per cent). One third (32 per cent) of all perinatal deaths in Glasgow occurred in this group.
2. Almost two-thirds (63 per cent) of all perinatal deaths occurred in babies of low birth-weight (2,500 G or less). A comparison of the weight distribution of Glasgow births with that for England and Wales showed that not only was the overall proportion of low weights greater in Glasgow (87 and 73 per thousand), but that in each weight group there was a marked excess.

One of the main interests of the research group in the monitoring of medical care was the utilisation of maternity services and a simple analysis of hospital confinement rates for some of the "high risk" categories showed that:—

1. While the overall rate of hospital delivery was 85 per cent, for some categories the rate was over 90 per cent—primigravida, elderly primigravida, toxaemia, ante partum haemorrhage and multiple pregnancies.
2. High parity, age over 35 years, previous still-birth (all with above-average mortality) were having a lesser effect on selection for hospital confinement.
3. Social conditions in Glasgow were poor. Forty-four per cent of births were to women living in one or two rooms. All had above-average hospital care rates and below-average mortality experience.

A comparison of perinatal mortality between domiciliary and hospital births showed that overall the ratio home/hospital was 18/33 but that in the age 35 plus, the number in hospital was greater than at home. This was evidence of a good selection of patients for admission. There was, however, a higher mortality for home births in primigravida and those under the age of 20.

The stage of pregnancy at which antenatal care began was of interest; there was an association between a late start of antenatal care, poor social circumstances and high parity.

Having outlined some of the early products of the linked record system, Dr. Richards noted that the important question remained to be answered and especially, whether the rewards of record linkage would justify the effort. It was the belief of the research group that they would, as in no other way could the data actually being collected on the public health be so effectively exploited for its comprehensive study, its monitoring and its management.

DISCUSSION

Professor E. A. Cheeseman, Department of Medical Statistics, Institute of Clinical Science, Belfast, opened the discussion. He outlined current development in record linkage in Northern Ireland where a 4-year research project was being introduced. It would include links between hospital data, including in-patient admissions, statistics from the Registrar General on births, deaths and marriages, and abstracts of routine school medical inspections. Other schemes including cancer and mental health registration and some out-patient activities were mentioned. While developments were slow and linked to the availability of skilled staff and finance, he noted that if accurate data existed the development of linkage should not be costly. Projects should relate to a whole service and not to separate departments; the unit should be the individual.

Attention was drawn to the weightings required for matching and the need to assess their value and the threshold for acceptable scores. The question of updating records which did not match sufficiently fully was important. Should these, although suitable for some purposes, be altered prior to admission to a master file? The number of systems of record linkage was relatively unimportant and some might question the need to split the "statistical" group to form a "personal" section.

In the subsequent discussion the following were the main points to emerge:—

1. **Weightings**

In reply to an enquiry whether weights were arbitrary or calculated, it was noted that 85 per cent of successive hospital records were complete "hits" and were thus primary matches. For the remainder which were doubtful matches, a secondary procedure with further checking was necessary giving a positive "weight" for areas of agreement and a negative one for discrepancies. The "weight" was mathematical and referred to the chances of two records selected at random agreeing for the item in question, e.g. for month of birth, the chance was one in twelve giving a positive weighting of three or four (using logs to base 2 of 1/12). Similarly disagreements could be assessed on a rational rather than an empirical basis with refinements relating to errors in probability rates when the same or different hospitals were involved.

2. **General practice records**

The number of "consultations" in general practice was too large for a national file at present though a group of practitioners might have their records handled on an area or regional basis. To adopt a more limited approach at this stage was justified as record linkage would be discredited if missed matches occurred. False matches could be clinically dangerous. It was more logical to aim in the first instance at processing key information required by general practitioners such as patients' age, sex, distance from the surgery, if over 75 years of age, if living alone, etc. For new patients additional information such as smoking habits or drug idiosyncracies might be added.

The documentation of all attendances in general practice was unlikely to be practicable in the near future and it was noted that quantitative comparisons between attendances or "contacts" in general practice on the one hand and at hospitals on the other, could be misleading. They assumed that simple conditions equated with complex problems, each being regarded as one unit. It was explained that the study involving the contraceptive pill, to which reference had been made, was related to the Family Planning Association and not to the Royal College of General Practitioners.

3. **Acceptance of data**

It was stressed that record linkage was not a form of uniform automatic research. The acceptance of data was not an "'all or none" phenomenon; the intelligent assessment of relevance remained essential.

4. **Place of residence**

Examples were given of anomalies due to changes in the status of communities and towns as they developed and the links between types of burgh and different areas of administration. These not only made the tracing of a patient's normal place of residence one of the most difficult elements to check but actually led to some being lost. The use of geographical co-ordinates using the national grid was suggested as a more accurate system although it was recognised that in any change of method there would be some loss of reference to previous data.*

5. **Confidentiality**

This was recognised to be one of the most important issues where clinical information might be accessible to a wide range of health service staff. The patient had an undoubted right to privacy but there was an element of conflict between a high level of secrecy on the one hand and the patient's right to correct treatment on the other. Degrees of confidentiality existed. Some form of security clearance might be built into the system and it was in this sphere that the proposal to identify a "personal" category in record linkage was relevant.

Instances were noted of systems in which it was impossible for particular records to be obtained until two people brought the components together. Some felt that in urgent situations this might be impractical though it might be possible for key points such as drug sensitivity to be isolated and made available on a different level of confidentiality. Every precaution should be taken to maintain the security of medical records but it was noted at the same time that substantial damages had been awarded as a result of a situation which might have been avoided if the relevant data had been more easily available.

6. **Accuracy at source**

It was maintained that the accuracy of primary records would only be achieved if the right categories of staff completed the data and if those undertaking this work were interested in it. The onus remained on clinicians to ensure that patients' records were carefully prepared. Quality control began at source and this included co-ordination of the definition of terms, e.g. between obstetrical data and health visitors' records.

7. **Unusual names**

It was recognised, particularly in relation to immigrants, that many unfamiliar names and doubtful dates of birth would be encountered and that if data were completely random in character, linkage would be impossible. If, however, some reliable information was available, the computer—which learned systematically and did not forget—would do better than the clerk.

8. **Special numbers, surnames, etc.**

For a population of about five million people special numbers of seven digits would be adequate but people seldom carried their identifying number and few would remember it. The value of surnames in relation to birth records was regarded as useful, particularly in Scotland where some 90 per cent of children were born in hospital. Addresses were also

* General Register Office, Scotland. Place names and population, Scotland, Edinburgh, H.M.S.O., 1967. 27/-.

valuable in matching. There was a point, however, beyond which an increased effort could lead to diminishing returns. In general the object was to use the minimum number of factors giving 90 per cent direct matching.

9. **Feedback and vital statistics**

With more information being accumulated the central record linkage file would be limited by bulk and it was recognised that for this and other reasons the development of peripheral schemes in direct relationship to the central unit would be important. It was suggested as regards vital statistics that for deaths occurring in January of any year there might be a fifteen month delay in feedback to regional units and that this would require to be overcome.

10. **The number of diagnoses**

The provision of space for only three diagnoses was regarded as inadequate for geriatric medicine. It was noted, however, that if evidence of the need for further space was produced, this could be provided.

11. **Social status**

In reply to an enquiry it was explained that at present retired people should be classified in the social category appropriate to their last full-time occupation.

12. **Further discussions**

In a fast-moving field like medical record linkage and with the evidence of widespread interest in it throughout the service, it was considered that after a suitable interval, a further reporting and discussion session should be arranged.

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